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Old Series Vol. XVI } CONTINUATION OF THE BULLETIN OF THE NORTHEASTERN BIRD-BANDING ASSOCIATION { New Series Vol. XII

BIRD-BANDING

A Journal of Ornithological Investigation

Vol. XII October 1941 No. 4

PUBLISHED FOR
THE NORTHEASTERN BIRD-BANDING ASSOCIATION
THE EASTERN BIRD-BANDING ASSOCIATION
AND
THE INLAND BIRD-BANDING ASSOCIATION

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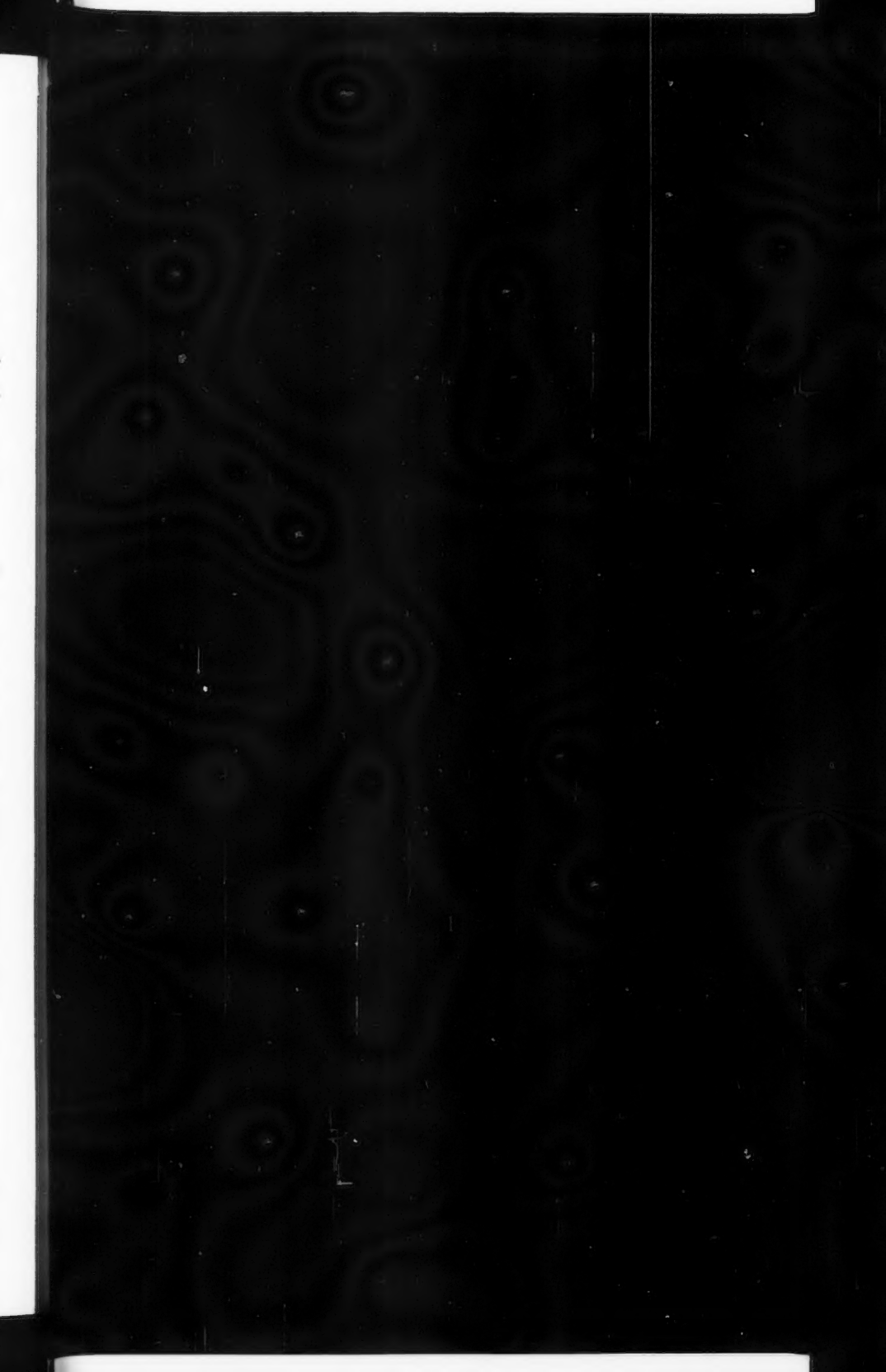


BIRD-BANDING

A JOURNAL OF ORNITHOLOGICAL INVESTIGATION

VOL. XII OCTOBER, 1941 NO. 4

TWELVE YEARS OF BANDING AT SUMMERVILLE, S. C.

By WILLIAM P. WHARTON

MY banding project at Summerville, S. C., having been terminated in April, 1937, after twelve consecutive seasons composed of the months of January, February, March and part of April, it may be appropriate to summarize a few of the more important results. The basic background for this paper is presented in tabular form herewith.

TABLE I

TOTALS BY YEARS AT SUMMERVILLE, S. C.

	Banded	*Returned*	*Totals*
1926	430	–	430
1927	407	25	432
1928	704	54	758
1929	658	115	773
1930	944	137	1,081
1931	1,164	197	1,361
1932	732	162	894
1933	1,655	166	1,821
1934	1,257	254	1,511
1935	1,226	234	1,460
1936	1,553	302	1,855
1937	1,156[1]	249	1,405
Totals	11,886	1,895	13,781

TABLE II

	Banded	*Returned*	*Totals*
True Winter Visitors	9,449	1,504	10,953
Possible Winter Visitors[2]	1,642	262	1,904
Permanent and Summer Residents	794	129	923
Total	11,885	1,895	13,780

TABLE III

NUMBER OF SPECIES BANDED

True Winter Visitors	26
Possible Winter Visitors	12
Permanent and Summer Residents	28
Totals	66

TABLE IV

ALL RETURNS AT SUMMERVILLE, SOUTH CAROLINA 1931–1937[3]

	1931	*1932*	*1933*	*1934*	*1935*	*1936*	*1937*	*Totals*
Sparrow Hawk	–	–	–	–	–	1	–	1
Bob White	1	5	1	–	–	–	–	7
Mourning Dove	–	–	–	–	1	–	–	1

[1] One was a Bobolink, a true migrant.

[2] See paragraph preceding Table VI for explanation of use of this term.

Blue Jay	–	1	1	5	2	5	1	15
Carolina Chickadee	–	–	–	–	2	–	–	2
Tufted Titmouse	–	2	2	4	3	4	4	19
Mockingbird	–	–	1	–	1	1	–	3
Catbird	1	–	–	1	1	1	–	4
Brown Thrasher	8	8	9	6	6	9	5	51
Hermit Thrush	3	–	–	1	1	2	1	8
Ruby-crowned Kinglet	1	–	–	1	–	–	–	2
American Pipit	–	–	–	–	–	1	–	1
Myrtle Warbler	1	1	1	–	–	–	–	3
Meadow Lark	3	–	–	–	16	14	17	50
Cardinal	5	5	7	6	7	9	7	46
Purple Finch	–	–	–	–	–	–	1	1
Red-eyed Towhee	14	6	7	15	3	16	10	71
White-eyed Towhee	6	1	5	2	2	6	4	26
Savanna Sparrow	1	1	1	6	5	2	12	28
Vesper Sparrow	3	6	3	5	3	1	–	21
Slate-colored Junco	1	1	2	–	3	1	–	8
Chipping Sparrow	58	57	65	122	94	90	103	588
Field Sparrow	19	12	9	11	18	20	21	110
White-throated Sparrow	70	50	46	61	63	116	60	466
Swamp Sparrow	–	–	–	–	1	–	–	1
Song Sparrow	2	4	4	8	2	2	3	25
26 Species	197	160	164	254	234	301	249	1,559[1]

In line with the topics discussed in previous articles (Bulletin N.E.B.B.A., January, 1928, and January, 1929; BIRD-BANDING, July, 1931, and October, 1935), consideration is here given to (1) Returns-W. of all species which can be considered wholly winter visitors, (2) Survival as indicated by returns of three species of winter visitors; (3) Recoveries reported during or following the twelve year period.

RETURNS–W. OF WINTER VISITORS

During the twelve years under consideration a total of 11,886 birds were banded, of which 9,449, belonging to 26 species, may properly be considered wholly winter visitors. Total numbers banded of each, and total returns, are shown in Table V. This material is based on the Fish & Wildlife Service's definition of the term "Return," which involves counting a given bird each year it is taken, and should not be confused with the data of survival referred to later in this paper.

TABLE V
WINTER VISITORS AT SUMMERVILLE, S. C.
1926–1937

	Banded	*Returned*	*Per Cent*
Yellow-bellied Sapsucker	3	–	–
Red-breasted Nuthatch	2	–	–
Brown Creeper	2	–	–
Winter Wren	1	–	–
Robin	172	–	–

[1] Returns taken prior to 1931, referred to in previous articles, are not here listed.

Hermit Thrush	81	10	12.34
Golden-crowned Kinglet	1	–	–
Ruby-crowned Kinglet	22	3	13.63
American Pipit	38	1	2.63
Cedar Waxwing	132	–	–
Orange-crowned Warbler	4	–	–
Myrtle Warbler	39	3	7.69
Palm Warbler	1	–	–
Rusty Blackbird	3	–	–
Cowbird	89	–	–
Purple Finch	101	1	0.99
Red-eyed Towhee	489	90	18.40
Savanna Sparrow	453	33	7.28
Grasshopper Sparrow	5	–	–
Vesper Sparrow	205	21	10.24
Slate-colored Junco	347	8	2.30
Chipping Sparrow	3,753	738	19.66
White-throated Sparrow	3,112	570	18.31
Fox Sparrow	56	–	–
Swamp Sparrow	42	1	2.38
Song Sparrow	296	25	8.44
26 Species	9,449	1,504	

The data presented in the above table emphasize once again the returning trend of most of these species to their winter quarters. There are, however, exceptions. Robins (*Turdus m. migratorius*) and Cedar Waxwings (*Bombycilla cedrorum*), for instance. Though banded in fair numbers during some seasons—the twelve year totals being 172 Robins and 132 Cedar Waxwings—not a single Return-W. was produced. Purple Finches (*Carpodacus p. purpureus*), of which 101 were banded, have produced but one. This may be accounted for by the wandering habits of these species in search of their favorite food supplies. The case of the Slate-colored Junco (*Junco h. hyemalis*) is different. Out of 347 banded, but eight returned, or 2.30%. Here is a species which is said to yield a large percentage of returns on its favorite wintering grounds in the north, but which shows a markedly lower percentage than the Chipping Sparrow (*Spizella p. passerina*), the species with which it generally associates in Summerville. Savanna Sparrows (*Passerculus sandwichensis savanna*), Vesper Sparrows (*Pooecetes g. gramineus*), and Song Sparrows (*Melospiza m. melodia*), also show rather low percentages of return, of which fact I can offer no explanation.

Because of the impossibility of arbitrarily classifying some of the species, Table VI was compiled under the title "Possible Winter Visitors." This group includes species which are both visitors and permanent residents in the region. The table indicates the number banded and the returns taken. Here again it is not comparable with the survival data which will be presented later in this paper. It is comparable with Table V.

TABLE VI
POSSIBLE WINTER VISITORS

	Banded	*Returned*	*Per Cent*
Sparrow Hawk	10	1	10.00
Mourning Dove	60	2	3.33
Blue Jay	173	19	10.98
Mockingbird	29	4	13.78
Catbird	56	4	7.14
Brown Thrasher	238	61	25.63
Pine Warbler	47	–	–
Meadow Lark	433	50	11.54
Red-winged Blackbird	26	–	–
Baltimore Oriole	1	–	–
Goldfinch	26	–	–
Field Sparrow	543	121	22.28
12 Species	1,642	262	

Scrutiny of the percentages of returns for individual species in this table discloses considerable differences as compared with species listed in Table V. For reasons not clear the Brown Thrasher (*Toxostoma rufum*) and Field Sparrow (*Spizella p. pusilla*) show higher percentages of returns than do any of the wholly migratory species. That this cannot be attributed entirely to their sedentary habits is shown by the fact that two banded Brown Thrashers have been recovered at points distant over 100 miles northerly from Summerville. While there has been no proof that any of the Field Sparrows wintering in Summerville move north in spring, there is every reason to suppose that some (probably a considerable number) do so. The percentage of returns decreases with the Mockingbird (*Mimus p. polyglottos*), usually regarded as sedentary, but this species in my experience is trap shy. Twenty-nine Mockingbirds were banded during the twelve years; four were taken as Returns-W. and one individual wandered north over 100 miles to Plymouth, N. C. Since not one Meadow Lark (*Sturnella magna*) of the 433 banded has ever been reported afterwards outside of Summerville, it may be assumed that this species is mostly sedentary; yet the percentage of returns is smaller than for the Brown Thrasher and Field Sparrow, and even less than for the Mockingbird.

SURVIVAL

The survival of White-throated Sparrows (*Zonotrichia albicollis*), Chipping Sparrows (*Spizella p. passerina*), and Red-eyed Towhees (*Pipilo e erythrophthalmus*) *as indicated by returns*, is shown in Tables VII, VIII and IX, and accompanying graphs. Of chief interest is the longer potential life span indicated for all these species as a result of accumulation of a greater mass of data. Thus three White-throated Sparrows have returned the sixth year after banding, one Chipping Sparrow eight years after, and one Towhee six years after.

TABLE VII
RED-EYED TOWHEE SURVIVAL RATIOS AT SUMMERVILLE, S. C.
Based on Birds Taken as Returns-W.

	Number Banded	*Per Cent Surviving in Years From Banding*					
		1	*2*	*3*	*4*	*5*	*6*
1926	18	5.55	5.55	–	–	–	–
1927	13	23.08	15.38	7.69	–	–	–
1928	36	25.00	5.55	5.55	–	–	–
1929	34	23.52	8.82	–	–	–	–
1930	65	20.00	12.30	7.69	4.61	4.61	1.54
1931	48	6.25	2.08	–	–	–	–
1932	34	20.58	14.70	5.88	5.88	–	
1933	61	18.03	6.55	4.92	1.64		
1934	51	7.84	7.84	–			
1935	31	22.58	16.13				
1936	46	17.39					
Average:		17.25	9.49	3.52	1.51	0.66	0.25

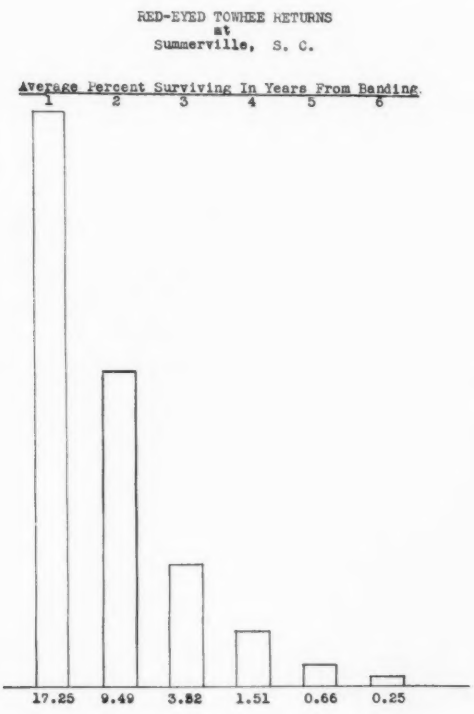


TABLE VIII

EASTERN CHIPPING SPARROW SURVIVAL RATIOS AT SUMMERVILLE, S. C.

Based on Birds Taken as Returns-W.

	Number Banded	*Per Cent Surviving in Years From Banding*							
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1926	191	8.90	4.18	1.57	0.52	–	–	–	–
1927	167	7.18	4.19	1.79	1.19	–	–	–	–
1928	313	18.53	9.90	4.15	1.24	0.64	0.32	0.32	0.32
1929	232	21.12	8.18	4.74	2.58	0.43	0.43	–	–
1930	255	15.29	6.66	3.14	1.17	1.17	–	–	
1931	332	12.95	8.43	3.61	1.81	0.90	0.30		
1932	237	16.45	8.86	4.22	2.11	1.26			
1933	714	15.26	7.28	3.92	0.98				
1934	318	15.40	8.17	5.34					
1935	188	22.87	10.64						
1936	410	13.41							
Average:		15.21	7.65	3.61	1.45	0.63	0.17	0.06	0.08

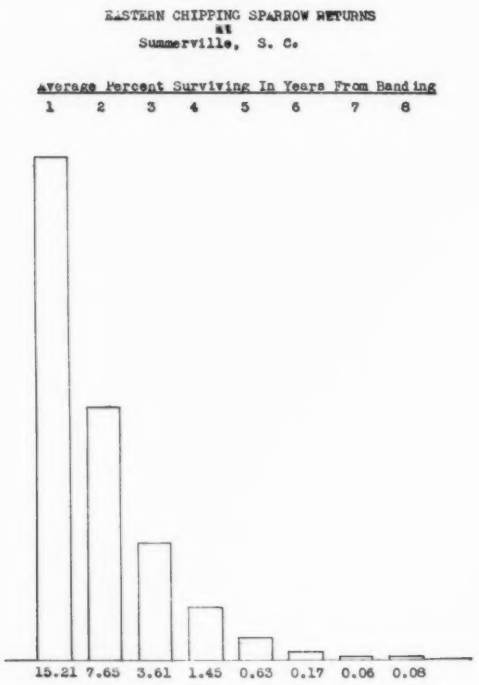
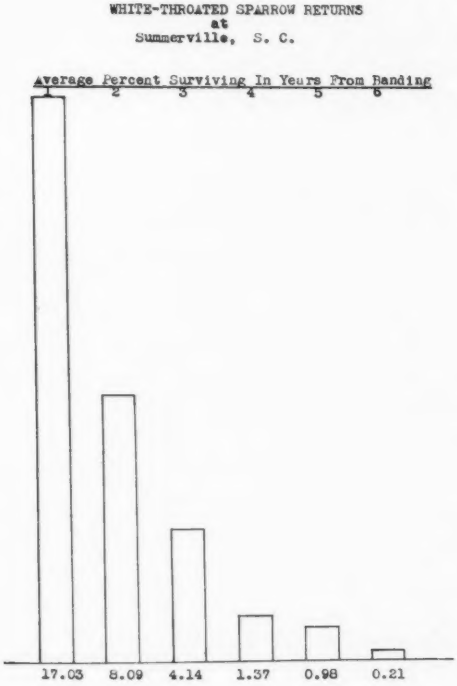

EASTERN CHIPPING SPARROW RETURNS
at
Summerville, S. C.
Average Percent Surviving In Years From Banding
1 2 3 4 5 6 7 8
15.21 7.65 3.61 1.45 0.63 0.17 0.06 0.08

TABLE IX
WHITE-THROATED SPARROW SURVIVAL RATIOS AT SUMMERVILLE, S. C.
Based on Birds Taken as Returns-W

	Number Banded	*Per Cent Surviving in Years from Banding*					
		1	*2*	*3*	*4*	*5*	*6*
1926	94	12.76	8.51	2.13	2.13	1.06	–
1927	104	24.03	8.65	5.76	0.96	–	–
1928	145	24.82	9.65	6.89	0.68	0.68	–
1929	169	17.75	10.65	4.73	1.77	0.59	0.59
1930	274	20.80	8.39	4.01	2.91	2.55	0.36
1931	321	14.33	7.47	3.42	1.24	0.93	0.31
1932	94	22.34	6.38	2.12	1.06	1.06	
1933	477	11.74	6.49	3.56	0.20		
1934	259	18.14	11.19	4.66			
1935	566	13.78	3.53				
1936	364	6.86					
Average:		17.03	8.09	4.14	1.37	0.98	0.21



From the above tables and graphs it will be noted that the average survival percentages of the three species for the earlier years following banding have changed only slightly from those presented in the article in BIRD-BANDING for October, 1935. There remains a sharp drop in first year returns as compared with the number originally banded, amounting to an average of 83.50%. The shrinkage the second year, compared with returns of the first year, is also similar—in this case an average of 47.85%. Later reductions vary only slightly with the different species.

In my article in the October, 1935, BIRD-BANDING, I said: "The very large loss in numbers during the first year after banding is striking in all three species—well over 80%." This statement still holds good, and the reasons for that loss remain unexplained. In 1935 I suggested that it was probably not due wholly to mortality, and I pointed out that "individuals of the youngest generation of birds doubtless average fully seven months of age when banded, are vigorous, and have experienced the vicissitudes of their first migration." I then went on to suggest further that the first nesting of these birds might lead to the formation of new attachments, with resulting migration by a portion of these birds to new wintering grounds. I said further: "Thus it seems not improbable that a wintering flock at Summerville may be chiefly composed of (1) young birds of the year, in many cases progeny of one or more old birds accustomed to winter here; (2) birds which have experienced one or more nesting seasons, and of which some are individuals which spent their first winter here, and others are their mates which spent their first winter in other localities." Perhaps I should have added after "mates" the phrase "or other closely associated individuals." Despite the fact that this theory was criticised by a reviewer, it still seems to me a reasonable explanation of the drastic first year shrinkage, and wholly in accord with the well recognized dispersal tendencies of young birds as they become sexually mature.

If a population shrinkage of 83.50% in the year following banding on wintering grounds does not reflect a dispersal to new wintering territory of a part of the population, the alternative is to believe that the high mortality period of young birds extends far beyond immaturity to include also their first northerly migration, first nesting, and second southerly migration. To my mind this is not a reasonable hypothesis. The problem may include also the question of whether the tendency to return to first year wintering grounds is equally strong for both sexes.

In this connection it should be noted that some substantially resident species such as Brown Thrashers and Tufted Titmice (*Baeolophus bicolor*) show a smaller percentage of loss the first year after banding than the three winter visitor species referred to

—77% and 76% respectively. On the other hand the resident White-eyed Towhees (*Pipilo erythrophthalmus alleni*) and Cardinals (*Richmondena c. cardinalis*) do not differ greatly from the White-throated Sparrows in this respect—there being an 83% shrinkage in both cases. Here again, dispersal may be an important factor in causing such marked declines in banded birds.

In closing this discussion of "survival," it should be emphasized that the percentages show survival only of those birds which returned to Summerville. As indicated in the discussion, there is to my mind reason to suppose that many of the first year banded birds survive which do not return to Summerville. Data are scarce on this point, but the reader is referred to the table of "Recoveries" at the end of this article for a few records of recoveries on their new wintering grounds of the three species under consideration.

RECOVERIES

Considering the number of birds banded, the recoveries reported are disappointingly few. When it is noted that out of 3,753 Chipping Sparrows and 3,112 White-throated Sparrows banded, only four and five birds of each species respectively have been reported as recoveries, it must be confessed that high expectations of accumulation of data bearing on migration routes have not been met. One Red-eyed Towhee out of 489 banded is not impressive either. Savanna Sparrows with 453 individuals banded, Song Sparrows with 296, and Vesper Sparrows with 205 have not produced a single, recovery. The fact that three Cedar Waxwings out of 132 banded were recovered, and those in the South, is a clear indication of how often conspicuously flocking birds are still shot in that section.

Migration records of interest from the viewpoint of direction or distance, include that of a Robin found dead at Fond du Lac, Wisconsin—a somewhat unexpected direction; a Red-eyed Towhee caught by a cat at Palmer, Massachusetts; a Chipping Sparrow found dead at St. Johnsbury, Vermont, after having returned twice to Summerville, and another trapped at North Eastham, Massachusetts; a White-throated Sparrow killed near St. Johns, Newfoundland, and another "caught" at Millertown, Newfoundland. With the exception of the Robin, which went northwesterly to Fond du Lac, Wisconsin, the trend of migration seems to have been from southwest to northeast, roughly paralleling the Atlantic Coast, as might be expected. Out of a total of 22 legitimate recoveries only eight were taken outside the South.

Appended is a list of the recovery records of birds banded at Summerville, South Carolina; also a list of the birds recovered at Summerville, all of which were banded to the North.

BIRDS BANDED AT SUMMERVILLE, S. C., AND RECOVERED ELSEWHERE

	Banded	*Recovered*	
Sparrow Hawk			
C337074[4]	Feb. 19, 1935	Ronda, N. C.	April 20, 1936 "caught"
C337034	Jan. 28, 1935	Elloree, S. C.	May 12, 1935 killed
Mourning Dove			
A410725	May 20, 1934	Witherbee, S. C.	Dec. 22, 1934 killed
Mockingbird			
A270337	Mar. 7, 1931	Plymouth, N. C.	Feb. 18, 1932 released
Brown Thrasher			
424880	April 3, 1927	Clinton, N. C.	Nov. 14, 1927 killed
B384274	Jan. 30, 1934	Severn Side, Md.	June 10, 1934 dead
Robin			
B272192	Mar. 23, 1934	Fond du Lac, Wis.	May 26, 1934 killed
Cedar Waxwing			
36-40040	April 3, 1936	Mt. Airy, N. C.	May 17, 1936 killed
36-5991	Mar. 18, 1936	Riceboro, Ga.	Jan. 26, 1937 shot
37-38907	Jan. 29, 1937	Oakley Depot, S. C.	Feb. 4, 1937 shot
Cowbird			
36-125366	Jan. 17, 1937	Hyman, S. C.	Mar. 6, 1937 shot
Red-eyed Towhee			
A270281	Jan. 14, 1931	Palmer, Mass.	May 8, 1931 killed
Chipping Sparrow			
B37085	April 1, 1928	St. Johnsbury, Vt.	May 27, 1930 dead
C50172	Mar. 23, 1930	Zebulon, N. C.	May 11, 1931 dead?
F25459	Mar. 18, 1931	Plantersville, S. C.	Feb. 7, 1932 dead
H31670	Feb. 6, 1933	North Eastham, Mass.	July 29, 1936 trapped
36-31199	Feb. 10, 1937	Allenwood, N. J.	June 18, 1939 killed
White-throated Sparrow			
C167644	Feb. 22, 1933	Four Oaks, N. C.	Dec. 22, 1933 shot
C183596	Mar. 13, 1933	Concord, N. C.	Nov. 6, 1933 released
F107151	Jan. 19, 1934	St. Johns, Newfoundland.	Aug. 10, 1934 killed
F107302	Mar. 22, 1934	Turberville, S. C.	Jan. 31, 1936 released?
35-133793	Feb. 20, 1936	Millertown, Newfoundland.	Aug. 6, 1936 "caught"

BIRDS RECOVERED AT OR NEAR SUMMERVILLE, S. C., BANDED ELSEWHERE

	Banded	*Where Banded and by Whom*	*When and How Recovered*
Robin			
B320245	Aug. 16, 1932	William Pepper Philadelphia, Pa.	Mar. 11, 1937 killed
Red-winged Blackbird			
B271336	Aug. 1, 1934	O. L. Austin North Eastham, Mass.	Dec. 25, 1934 shot
Chipping Sparrow			
35-6124	Sept. 13, 1936	W. E. Smith South Chatham, Mass.	Mar. 11, 1937 trapped
Vesper Sparrow			
B112814	Oct. 14, 1930	O. L. Austin North Eastham, Mass.	Mar. 13, 1933 trapped
White-throated Sparrow			
B123698	Oct. 7, 1932	R. M. Hinchman Milton, Mass.	Mar. 27, 1933 trapped

Groton, Massachusetts.

THIRD PROGRESS REPORT ON THE DISEASE STUDY PROJECT

By CARLTON M. HERMAN

IN 1937 a cooperative project was launched for the study of bird diseases (*Bird Banding*, VIII: 109-113). The plan was to have banders and other ornithologists send all dead birds to cooperating students of bird diseases for examination. The project has steadily grown, two progress reports have already appeared (*Bird Banding*, IX: 101-102 and *idem*, X: 35–38). At first only a few pathologists on the eastern seaboard were approached and bird banders have responded so enthusiastically that now the project has become national in scope. It, therefore, seems advisable at this time to publish a list of the pathologists cooperating and to point out some of the information that has been brought to light by this study. It is hoped that many more banders will be stimulated to send in dead birds to their regional cooperator and thus aid in adding to this knowledge.

The present list of investigators is:

NORTHERN NEW ENGLAND REGION

Dr. E. E. Tyzzer, Harvard Medical School, Department of Comparative Pathology, Boston, Mass.

[4] This bird was released, after banding, at St. George, S. C., a distance of about 30 miles. It was taken as a return on Feb. 2, 1936, and again released at St. George, the above recovery record being made over two months later.

SOUTHERN NEW ENGLAND REGION

Dr. Irwin Jungherr, Storrs Experiment Station, Storrs, Conn.

NORTHERN NEW YORK REGION

Dr. Gordon M. Meade, Associate Director, Strong Memorial Hospital, Rochester, N. Y.

SOUTHERN NEW YORK REGION

Laboratory and Hospital, New York Zoological Park, 185th Street and Southern Boulevard, New York, N. Y. Dr. Leonard J. Goss.

NEW JERSEY REGION

Dr. F. R. Beaudette, New Jersey Agricultural Experiment Station, New Brunswick, N. J.

PHILADELPHIA REGION

Dr. C. Brooke Worth, Swarthmore College, Swarthmore, Pa., or Penrose Research Laboratory, The Zoological Gardens, 34th Street and Girard Avenue, Philadelphia, Pa. Dr. H. L. Ratcliffe.

WASHINGTON (D. C.) REGION

Dr. J. E. Shillinger, Fish and Wildlife Service, U. S. Department of the Interior, Washington, D. C.

SOUTHEASTERN REGION

Dr. Elon E. Byrd, University of Georgia, Athens, Ga.

MICHIGAN REGION

Dr. Earl C. O'Roke, University of Michigan, College of Forestry, Ann Arbor, Mich.

MINNESOTA REGION

Dr. Robert G. Green, University of Minnesota, Medical School, Minneapolis, Minn.

PACIFIC COAST REGION

Biological Research Institute, San Diego Zoo, Balboa Park, San Diego, Calif. Dr. Frank D. McKenney, or Los Angeles Wildlife Disease Research Station, 203 Administration Building, Union Stock Yards, Los Angeles, Calif.

Since the last report the greatest number of birds for study have been received in the Philadelphia, New Jersey and New York regions. Dr. Worth reports the examination of over 185 birds during this period, Dr. Beaudette 71, and over 54 have been examined at the New York Zoological Park. At the other stations the birds examined have numbered only 10 or less and further cooperation of the banders is needed to increase the value of this undertaking in those regions. The total number of birds examined since the project began is approaching 500, and as this number increases it is hoped that we may obtain valuable information on the relative occurrence of diseases in our wild birds. All the cooperators agree that valuable information can be expected only through the examination of great numbers of specimens.

Already some very interesting findings are being uncovered. As early as the October, 1938 meetings of the American Ornithologists' Union, Dr. Worth and the author reported the occurrence of a canker-like disease in Mourning Doves from some of the eastern

states. Since that time we have received either reports or specimens with this disease from as far south as South Carolina and north to Massachusetts. Cases also have been noted from other parts of the country. This disease is being further studied by the author.

Two of our cooperators, Dr. Beaudette and Dr. Tyzzer, have been actively interested in the occurrence of equine encephalomyelitis in wild birds and have published several papers (see bibliography). This is a virus disease primarily of horses, and during recent years cases of a similar nature believed by many workers to be the same disease have been reported from man. From time to time in medical history scientific workers have attempted to incriminate wild birds in the dissemination of diseases of humans and domesticated animals. Sometimes these suspicions have been authenticated, sometimes disproved. For many years it was considered that various species of sparrows were a factor in the spread of coccidiosis among poultry, but Boughton (1937), and others, have definitely disproved this belief. Bird banders should be vitally interested in assisting to obtain the true facts in each case, as well as learning more about the causes of death among their trap visitors.

The cooperating pathologists are collaborating with each other and workers who specialize in particular groups of parasites or other disease organisms. The material you send in is studied in every detail possible, with the facilities and knowledge available. Often birds are received in such poor condition that they are not only valueless to the person performing a necropsy, but an annoying waste of time. Every effort should be made to get the birds to the cooperators as quickly and as fresh as possible, and the lack of sufficient data to make a diagnosis should not discourage us from continuing with this project. Even individual birds have added to our knowledge of what might be occurring in nature. Several of us have seen diseases in individual birds which will be published when more evidence and information is obtained from further specimens. Worth (1940) has reported an anatomical abnormality of the bill of a Slate-colored Junco which was undoubtedly the cause of a heavy infestation with bird lice. Beaudette (1940) has reported a case of pseudotuberculosis in a blackbird, the first report of this disease in a free-flying bird in North America. He has also reported, for the first time, the occurrence of a trematode worm (fluke) from the subcutaneous tissues of a Purple Finch.

Continued cooperation of bird banders and field ornithologists will undoubtedly reveal many more such interesting cases. Be sure to send all sick or dead birds to the nearest cooperator listed at the beginning of this note.

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RETURNS FROM BANDED BIRDS: RECOVERIES OF SOME BANDED BIRDS OF PREY

By MAY THACHER COOKE

THE first paper in this series (Lincoln, Frederick C., Recoveries of Banded Birds of Prey, vol. 8, 1936, p. 38–45) dealt with hawks and owls. Since then the number of these birds banded has nearly trebled with a comparable increase in the number of interesting returns. Considering also the present interest in this group, another paper about it seems justified.

The banding of large birds, especially hawks and owls is quite a different matter from the handling of small birds. Several co-operators have rather specialized in this phase of the work, and each has worked out his own technique. For several years, Richard H. Pough of the National Audubon Society has taken a great interest in this work and co-operators under his supervision have banded more than a thousand birds, the returns from which have provided many valuable data.

Birds of prey have popularly been considered long-lived birds and have often proved so—in zoos. However, few of our banded birds have survived more than a year or two and the records here presented give ample evidence of the indiscriminate war against hawks and owls in recent years. How indiscriminate this is can be further shown by a few figures. Excluding the vultures, about eleven percent of the hawks and owls banded have been of the species classed as harmful. But the recoveries for the beneficial

kinds are only about one percent less than for the harmful ones, showing that numerically many more of the birds killed are of the beneficial species. It is probably a safe estimate that nine-tenths of the recoveries represent birds killed.

These records also present a picture of the migrations and wanderings of these birds. A study of them will reveal several instances of birds that have made surprising journeys and in unexpected directions from the place of banding. It should be noted that these strange wanderings were done by birds of the year. Banding records are indicating that the post-juvenile wanderings of young birds is not confined to the herons among which the habit has long been well known, but may be fairly general among many of the non-passerine species.

As in previous papers, an asterisk preceding the number indicates that the bird was known to be a bird of the year when banded.

TURKEY VULTURE. *Cathartes aura septentrionalis*

*4925, banded at Vicksburg, Mich., on June 23, 1935, by F. W. Rapp, was probably killed at Boston, Ga., in January, 1936.

A727991, banded at Hampton, Va., on October 27, 1934, by Victor Coles ,was found crippled near Lee Hall, Va., in April, 1938.

34-703613, banded at Hampton, Va., on December 15, 1934, by Victor Coles, was found dead near Feagaville, Md., July 19, 1938.

34-703730, banded at Hampton, Va., February 5, 1935, by Victor Coles, was killed in a steel trap at Klingerstown, Pa., about February 8, 1936.

*34-705181, banded at Hampton, Va., on April 24, 1935, by Victor Coles, was found dead at Fort Bragg Military Reservation, N. C., December, 3, 1935.

*34-706502, banded at Hampton, Va., on April 25, 1935, by Victor Coles, was killed in a steel trap at La Grange, N. C., about January 4, 1937.

*34-706529, banded at Hampton, Va., April 27, 1935, by Victor Coles, was captured at Conway, S. C., about February 5, 1937.

34-706759, banded at Sugar Grove, Ohio, on May 19, 1937, by Victor Coles, was captured at Sneedville, Tenn., November 11, 1938.

BLACK VULTURE. *Coragyps atratus*

34-705024, banded at Hampton, Va., on April 2, 1935, by Victor Coles, was found dead at Raleigh, N. C., March 30, 1936.

34-705193, banded at Hampton, Va., on April 25, 1935, by Victor Coles, was killed about five miles from Littleton, N. C., June 1, 1936.

34-645130, banded at Avery Island, La., on April 11, 1936, by E. A. McIlhenny, was captured near Columbus, Tex., July 8, 1937.

34-645211, banded at Avery Island, La., on April 11, 1936, by E. A. McIlhenny, was shot in Orange Co., Tex., in October, 1936.

34-653935, banded at Avery Island, La., on October 19, 1935, by E. A. McIlhenny, was shot six miles northwest of Sherman, Tex., April 16, 1937.

34-706535, banded at Hampton, Va., on April 28, 1935, by Victor Coles, was probably found dead at Barhamsville, Va., about February 7, 1938.

36-801869, banded at Avery Island, La., on November 16, 1935, by E. A. McIlhenny, was found dead in Hardin County, Tex., August 14, 1937.

36-811836, banded at Avery Island, La., on November 21, 1936, by E. A. McIlhenny, was caught in a chicken house at Hobson, Ala., May 14, 1938.

36-811838, banded at Avery Island, La., on November 21, 1936, by E. A. McIlhenny, found with an injured wing at Chatom, Ala., May 13, 1938.

36-811878, banded at Avery Island, La., on November 21, 1936, by E. A. McIlhenny, was captured near Columbus, Tex., about July 16, 1937.
36-811978, banded at Avery Island, La., on November 29, 1936, by E.A. McIlhenny, was found dead near Liberty, Tex., January 6, 1937.
36-812082, banded at Avery Island, La., on January 30, 1937, by E. A. McIlhenny, was found dead at Baldwin, La., on March 2, 1938.
36-812382, banded at Avery Island, La., on February 6, 1936, by E. A. McIlhenny, was shot fifteen miles south of Welsh, La., on September 10, 1937.
38-801473, banded at Avery Island, La., on November 6, 1937, by E. A. McIlhenny, was found ill near Jackson, Miss., May 3, 1938.
38-801946, banded at Avery Island, La., on November 15, 1937, by E. A. McIlhenny, was caught at White Castle, La., about December 11, 1937.

GOSHAWK. *Astur atricapillus*

*38-640473, banded at Pole Mountain, Albany County, Wyo., on June 23, 1938, by A. B. Mickey, was found killing chickens and shot at Gulnare, Las Animas County, Colo., October 29, 1938.

SHARP-SHINNED HAWK. *Accipiter velox*

*A428009, banded at Leetonia, Ohio, on July 9, 1933, by Paul A. Stewart, was killed at Guyandotte, W. Va., October 20, 1933.
*A428011, banded at Leetonia, Ohio, on July 9, 1933, by Paul A. Stewart, was killed at Murfreesboro, Tenn., December 9, 1933.
*A409757, banded at Glenevis, Alta., on July 19, 1936, by Fred H. Pegg, was found dead near Thatcher, Ariz., January 26, 1937.
A546857, banded at Key West, Fla., on December 3, 1935, by W. W. Demeritt, was killed at Keyport, N. J., May 25, 1936.

COOPER'S HAWK. *Accipiter cooperi*

*386664, banded at Chester, Mass., on July 2, 1928, by Harry E. Woods, was killed at Taylor's Island, Md., October 28, 1930.
*599855, banded at Toledo, Ohio, on June 30, 1929, by Louis W. Campbell, was probably killed near Gainesboro, Tenn., December 1, 1929.
*A562142, banded at Pinckney, Mich., on July 8, 1933, by Paul F. Hickie, was found dead at Springfield, Ky., December 15, 1933.
*A573005, banded at Charleswood, Man., on July 8, 1933, by Joseph P. Kennedy, was shot at Colonia Agricola de Sumapaz, Colombia, South America, February 1, 1938.
*A573118, banded at Winnipeg, Man., on July 8, 1935, by Joseph P. Kennedy, was killed at Avoca, Tex., September 23, 1935.
35-402408, banded at Chester, Mass., on June 20, 1935, by Albert A. Cross, was captured, probably released, at Oxford, Pa., September 24, 1935.
*38-646478, banded at Orlando Park, Ill., on June 20, 1938, by K. E. Bartel, was shot at Cherokee, Ala., November 16, 1938.

RED-TAILED HAWK. *Buteo borealis*

*302126, banded at Jackson, Wyo., on June 22, 1931, by O. J. Murie, was found wounded at Coalcoman, Michoacan, Mexico, January 11, 1932.
420282, banded at Fairdale, N. Dak., on April 14, 1931, by Frank J. Vejtasa, was killed near Victoria, Tex., about July 1, 1935.
*661177, banded at Muscow, Sask., on June 30, 1929, by John R. Carter, was caught in trap at Baldwin, Ark., January 17, 1934.
A678402, banded at Camrose, Alta., on April 30, 1932, by F. L. Farley, was shot at Spalding, Nebr., November 29, 1932.
*A715051, banded at Hepburn, Sask., on August 3, 1933, by Philip Siemens, was killed at Hugo, Okla., December 28, 1933.
*A724818, banded at Lamont, Alta., on July 13, 1937, by T. E. Randall, was caught in trap at Tyler, Tex., September 1, 1937.

*34-624218, banded at Rosebud, Alta., on June 30, 1936, by W. R. Salt, was killed at Jourdanton, Tex., February 3, 1937.

34-652242, banded at Stockton, Kans., on October 14, 1935, by R. H. Imler, was caught at Carbon, Tex., January 30, 1937.

*34-652748, banded at Midwest, Wyo., on June 16, 1938, by N. Young, was shot at Paducah, Tex., January 3, 1939.

*34-705713, banded near Rosebud, Alta., on July 4, 1936, by W. R. Salt, was found in Waco, Tex., January 13, 1938.

*34-705714, banded at Rosebud, Alta., on July 4, 1936, by W. R. Salt, was shot in Roscoe, Nebr., September 28, 1936.

*34-702382, banded at Madison, Wis., on June 20, 1936, by George Wagner, was killed near McComb, Miss., November 24, 1936.

*36-631246, banded at Waubay National Wildlife Refuge, S. Dak., on July 19, 1937, by W. E. Beed, was probably shot in Cameron Parish, La., January 20, 1938.

*36-713807, banded at Clinton, Iowa, on May 24, 1936, by M. L. Miles, was probably found dead at Hedrick, Ind., December 3, 1936.

*36-714651, banded in Whitman County, Wash., on May 14, 1936, by L. H. Smith, was shot near Springville, Utah, November 8, 1936.

*36-714742, banded at Park River, N. Dak., on June 21, 1936, by A. C. Fox, was killed near Baton Rouge, La., Deecmber 7, 1937.

36-715549, banded near Cedar Grove, Wis., on October 7, 1937, by O. J. Gromme, was shot at Baton Rouge, La., January 20, 1938.

36-715550, banded near Cedar Grove, Wis., on October 7, 1937, by O. J. Gromme, was shot near Calhoun, Ala., February 28, 1938.

36-720569, banded at Stockton, Kans., on November 24, 1936, by R. H. Imler, was killed at Lacombe, Alta., December 7, 1937.

*37-709857, banded at Seneca, Md., on May 6, 1937, by R. F. McDermott, was killed at Mascoutah, Ill., August 30, 1937.

37-712712, banded at Escanaba, Mich., on October 13, 1937, by W. S. Feeney, was shot at Lafayette, La., December 8, 1937.

*38-713310, banded at Sublett Ranger Station, Power County, Idaho, on June 9, 1939, by C. H. McDonald, was killed near Brush, Colo, September 17, 1939.

39-723991, banded at Jackson, Wyoming, on June 4, 1939, by O. J. Murie, was shot at Torreon, Coahuila, Mexico, January 21, 1940.

RED-SHOULDERED HAWK. *Buteo lineatus*

210564, banded at Demarest, N. J., May 5, 1926, by B. S. Bowdish, was caught in trap and killed at Asheboro, N. C., January 18, 1927.

559750, banded at Chester, Mass., on May 31, 1936, by H. E. Woods, was caught at Pilot Mountain, N. C., March 2, 1937.

*559800, banded near Amherst, Mass., on May 28, 1933, by H. E. Woods, was caught and released at Boonton, N. J., January 20, 1934.

*660552, banded at Huntington, Mass., on June 14, 1931, by A. A. Cross, was killed at Freeman, N. C., January 4, 1934.

*660553, banded at Huntington, Mass., on June 14, 1931, by A. A. Cross, was killed at Oak Hill, Ala., December 27, 1936.

*C616793, banded at Leverett, Mass., on June 11, 1935, by S. A. Eliot, Jr., was shot at Roberta, Ga., October 28, 1935.

*34-656951, banded at Waukesha, Wis., on June 5, 1935, by Robert Adams, was found dead at Swifton, Ark., October 30, 1935.

34-661450, banded at Nashville, Tenn., on January 14, 1937, by Mrs. F. C. Laskey, was caught at Lansing, Mich., March 20, 1938.

*35-510269, banded at Chester, Mass., on May 30, 1937, by A. A. Cross, was probably killed at Lewes, Del., December 25, 1937.

BROAD-WINGED HAWK. *Buteo platypterus*

*560363, banded at North Eastham, Mass., on July 15, 1929, by O. L. Austin, was shot at Berlin, Md., December 11, 1929.

*35-514820, banded at Laverock, Pa., on June 28, 1936, by J. A. Gillespie, was shot at Altavista, Va., September 15, 1936.

*35-526256, banded at Glenevis, Alta., on July 22, 1936, by Fred H. Pegg, was shot one mile from Cabool, Mo., on October 6, 1936.

*37-514931, banded near Minneapolis, Minn., on July 18, 1937, by Bob Upson, was shot near Savanna, Ill., September 11, 1937.

*38-644794, banded at South Harrison, Maine, on July 5, 1938, by Peregrine Club members, was found at Rio Hato, Republic of Panama, December, 1938.

SWAINSON'S HAWK. *Buteo swainsoni*

*B646421, banded at Rosebud, Alta., on July 15, 1934, by W. R. Salt, was probably shot at Chillicothe, Tex., about October 20, 1934.

*C632947, banded at Dollard, Sask., on August 4, 1935, by C. F. Holmes, was shot at Tholny, Mont., August 4, 1937.

36-607606, banded at Stockton, Kans., on October 2, 1936, by R. H. Imler, was shot at Hussar, Alta., August 18, 1937.

36-714405, banded at New England, N. Dak., on August 11, 1938, by A. C. Fox, was shot in Thayer County, Nebr., October 17, 1938.

AMERICAN ROUGH-LEGGED HAWK. *Buteo lagopus s.-johannis*

324943, banded at Kamouraska, Que., on May 5, 1931, by Willie La Brie, was shot at Kempton, Ill., November 11, 1931.

*724892, banded at Rosebud, Alta., on June 29, 1936, by W. R. Salt, was found dead near Yoder, Wyo., October 6, 1936.

C617961, banded at Ellinwood, Kans., on November 5, 1935, by F. W. Robl, was killed at Newark, Tex., March 15, 1936.

36-704759, banded at Stockton, Kans., on December 16, 1935, by R. H. Imler, was shot at Langdon, N. Dak., May 17, 1937.

36-704765, banded at Stockton, Kans., on January 15, 1936, by R. R. Imler, was trapped and released one-half mile away on December 11, 1936.

*36-802161, banded at Beynon, Alta., on Julv 2, 1936, by W. R. Salt, was shot near North Platte, Nebr., October 21, 1936.

37-709470, banded at Stockton, Kans., on December 1, 1937, by V. H. Maddy, was shot at Grand Island, Nebr., January 27, 1938.

FERRUGINOUS ROUGH-LEG. *Buteo regalis*

*A717513, banded at Beynon, Alta., on June 16, 1934, by W. R. Salt, was found, probably dead, in Beaver County, Okla., February 14, 1939.

*A724897, banded at Beynon, Alta., on July 2, 1936, by W. R. Salt, was found, probably dead, at Holyoke, Colo., about January 7, 1937.

*34-705721, banded at Beynon, Alta., on June 25, 1938, by W. R. Salt, was shot 12 miles S. W. of Shamrock, Tex., October 30, 1938.

36-704762, banded at Stockton, Kans., on January 3, 1936, by R. H. Imler, was shot at Bengough, Sask., June 14, 1938.

39-721030, banded at Battle Creek, Mont., on June 8, 1939, by Bill Musgrove, was shot at Pittville, Calif., November 27, 1939.

GOLDEN EAGLE. *Aquila chrysaetos*

202902, banded at Laguna Beach, Calif., on May 8, 1927, by Wright M. Pierce, was killed at El Descanso, Baja California, Mexico, October 10, 1937.

36-802822, banded at Nashville, Tenn., on February 26, 1936, and released in Great Smoky Mts. National Park, by Mrs. F. C. Laskey, was killed at Headwaters, Va., March 10, 1938.

*36-806906, banded near Valley Center, Calif., on June 18, 1938, by Ralph E. Dixon, was found dead at El Triunfo, Baja California, Mexico, November 21, 1938.

BALD EAGLE. *Haliaeetus leucocephalus*

*233467, banded near Sebastian, Fla., on January 28, 1931, by I. H. Johnston, was found wounded and was killed 6 miles north of Langley Field, Va., August 7, 1931.

A717552, banded at Kittery Point, Maine, on November 5, 1934, by Horace Mitchell, was shot at Richelieu Village, Que., October 22, 1935.

*A730945, banded at Bombay Hook National Wildlife Refuge, Del., by H. Buckalew, May 20, 1938, was found exhausted, cared for and probably released at Chatham, Mass., August 25, 1938.

*34-701292, banded at Back River Neck, 15 miles east of Baltimore, Md., on June 23, 1936, by W. Bryant Tyrrell, was shot at Laurel, Md., October 20, 1937.

34-703340, banded at Shiloh, Fla., on January 27, 1935, by J. C. Howell, was found dead at Canonsburg, Pa., about June 17, 1935.

*36-809405, banded at Seaville, N. J., on April 4, 1937, by J. A. Gillespie, was shot at Berlin, Md., January 19, 1939.

*36-810392, banded at Marco Island, Fla., on February 1, 1938, by E. J. Reimann, was shot at Princess Anne, Va., January 10, 1939.

*38-805536, banded at Indian Rocks, Fla., on February 6, 1940, by C. L. Broley, was captured at Lake Etchemin near St. Germaine, Dorchester Co., Quebec, May 6, 1940, and died in captivity August 15, 1940.

MARSH HAWK. *Circus hudsonius*

ABBA 35532, banded in Anoka County, Minn., on July 12, 1932, by W. J. Breckenridge, was killed September 15, 1936 at Blanco, Tex.

225053, banded at Montrose, Colo., on June 28, 1929, by A. R. McCrimmon, was killed at Needville, Tex., October 22, 1929.

367355, banded at Kamouraska, Que., on April 3, 1930, by Willie La Brie, was shot at Greensboro, N. C., November 7, 1930.

*368471, banded at Muscow, Sask., on June 23, 1929, by R. H. Carter, was shot at Kenedy, Tex., December 6, 1929.

*542955, banded at St. Martins, Que., on July 7, 1935, by W. J. Low, was shot at Murray River, Prince Edward Island, July 13, 1937.

*542961, banded at St. Dorothea, Que., on July 11, 1937, by W. J. Low, was found dead at Mt. Joy, Pa., November 18, 1937.

*656130, banded at Dayton, Ohio, on June 15, 1930, by Louis B. Kalter, was killed at Braggadocio, Mo., November 22, 1930.

656822, banded at Antwerp, Ohio, on July 6, 1930, by O. E. Ehrhart, was killed at Union Church, Miss., December 12, 1930.

A525752, banded near ZIOL, Ill., on July 10, 1932, by C. E. Holcombe, was killed at Port Lavaca, Tex., December 31, 1932.

*A533575, banded at Battle Creek, Mich., on July 29, 1938, by Miles D. Pirnie, was killed at Farmerville, La., September 19, 1938.

*A568784, banded at Hyas, Sask., on July 1, 1934, by Wm. L. Wotherspoon, was killed 13 miles east of Temple, Tex., November 15, 1934.

*A626621, banded at Madison, Wis., June 13, 1930, by George Wagner, was killed at Downs, Kans., August 21, 1930.

*A626650, banded at Garden Prairie, Ill., on July 10, 1930, by D. J. Johnson, was probably killed at Port Tampa, Fla., October 13, 1930.

*A685631, banded at Regina, Sask., on June 29, 1934, by Fred G. Bard, was killed at Nile, Wash., August 26, 1934.

A695953, banded in Wood County, Wis., on July 18, 1934, by F. J. W. Schmidt, was shot at Lindsay, Nebr., September 30, 1934.

*A721713, banded at Ruthven, Iowa, on September 13, 1934, by Paul Errington, was shot 25 miles southwest of Bay Minette, Ala., October 21, 1934.

*B621404, banded at Toledo, Ohio, on June 22, 1932, by L. W. Campbell, was caught in trap 15 miles southwest of Bay City, Texas, January 8, 1935.

*34-519180, banded at Hyas, Sask, on April 25, 1936, by W. L. Wotherspoon, was shot at Davie, Fla., February 6, 1937.

*35-404612, banded at Crescent Lake National Wildlife Refuge, Nebr., on June 11, 1938, by R. H. Imler, was shot at Cushing, Okla., September 6, 1938.

*36-512212, banded at Cedar Grove, Wis., on April 29, 1938, by O. J. Gromme, was shot at Davenport, Fla., January 23, 1939.

36-512230, banded at Cedar Grove, Wis., on April 28, 1938, by O. J. Gromme, was shot at Arcola, Miss., November 27, 1938.

36-525025, banded at Medicine Lake, National Wildlife Refuge, Mont., on September 2, 1938, by P. T. Kreager, was shot near Tulsa, Okla., November 16, 1938.

36-527259, banded at Cape May Point, N. J., on November 5, 1936, by James T. Tanner, was killed in Currituck County, N. C., about December 16, 1936.

*36-637919, banded at Park River, N. Dak., on July 24, 1936, by A. C. Fox, was shot at Lockwood, Mo., October 28, 1936.

*36-670459, banded at Lower Souris National Wildlife Refuge, Upham, N. Dak., on June 21, 1937, by C. J. Henry, was shot near Everman, Tex., September 11, 1937.

*36-670515, banded in McHenry County, N. Dak., on July 5, 1937, by C. J. Henry, was killed at Tangancicuaro, Michoacan, Mexico, March 9, 1938.

36-670519, banded at Lower Souris National Wildlife Refuge, Upham, N. Dak., on July 5, 1937, by C. J. Henry, was shot at Ranger, Tex., November 26, 1937.

*36-670823, banded at Lower Souris National Wildlife Refuge, Upham, N. Dak., on July 10, 1938, by C. J. Henry, was shot at Edgewood, B. C., September, 1938.

*37-509701, banded at Minneapolis, Minn., on June 25, 1937, by Bob Upson, was killed at Jamaicatown, Habana, Cuba, January 26, 1938.

*37-514923, banded at Winamac, Ind., on June 23, 1937, by W. S. Feeney, was shot at Powhatan, La., November 24, 1937.

38-601728, banded at Redfield, S. Dak., on June 23, 1938, by F. Curtis, was shot 35 miles southeast of Lake Charles, La., December 13, 1938.

38-711501, banded near Portal, N. Dak., on June 26, 1938, by Thomas Tate, was killed at Pahuirachic, Guerrero, Chihuahua, Mexico, January 23, 1939.

OSPREY: *Pandion haliaetus carolinensis*

422611, banded at Orient, L. I., N. Y., on June 30, 1928, by LeRoy Wilcox, was shot on board a steamer 60 miles east of Cape Hatteras, N. C., September 20, 1928.

*A700307, banded at Avalon, N. J., on August 10, 1929, by C. Brooke Worth, was killed at Brandywine, W. Va., September, 1929.

*A700460, banded at Orient, L. I., N. Y., on June 20, 1936, by Le Roy Wilcox, was found dead at Banco da Victoria, 7 miles west of Ilheos, Brazil, August 12, 1937.

A712849, banded at Slaughter Beach, Del., on May 15, 1931, by H. Buckalew, was killed at Central Almeida, Ortega, Cuba, November, 1939.

*A719088, banded at Cedar Beach, Del., on July 1, 1934, by Herbert Buckalew, was killed at Shellman Bluff, McIntosh County, Ga., October 8, 1934.

*A721003, banded at Avalon, N. J., on August 5, 1932, by C. Brooke Worth, was shot at McIntyre, Fla., October 1, 1932.

*A727056, banded at Orient, L. I., N. Y., on July 23, 1933, by Mrs. Marie V. Beals, was shot on the mast of a ship 73 miles off Cape Hatteras, N. C., October 9, 1933.

*A727057, banded at Orient, L. I., N. Y., on July 23, 1933, by Mrs. Marie V. Beals, was found wounded at Edgartown, Mass., May 29, 1935.

*A728404, banded at North Cape May, N. J., on July 27, 1933, by C. Brooke Worth, was killed at Andrews, N. C., September 13, 1933.

*34-701235, banded at Smith's Point, Va., on June 23, 1934, by W. Bryant Tirrell, was probably found dead at Thomasville, N. C., about April 16, 1936.
*34-708159, banded at Gardiners Island, N. Y., on July 18, 1940, by Le Roy Wilcox, was found dead at Tilton, N. H., August 23, 1940.
*36-807059, banded at Jordan's Delight, Maine, on August 6, 1938, by G. H. Parks, was found dead at Grassy Point, on Hudson River, near Garnerville, N. Y., October 24, 1938.
*36-807801, banded in Cape May County, N. J., on July 16, 1939, by J. A. Gillespie, was taken at Lagunillas, Venezuela, S. A., about December 14, 1939.
*36-809436, banded at Avalon, N. J., on July 5, 1937, by J. A. Gillespie, was shot at sea, Lat., 31°, Long., 79°, off the coast of Georgia, September 20, 1937.
*36-809468, banded in Cape May County, N. J., on July 12, 1937, by J. A. Gillespie, was shot at Cuyagua, Aragua, Venezuela, January 24, 1938.
*36-809499, banded in Cape May County, N. J., by J. A. Gillespie, on August 14, 1937, was captured 23 miles north of Crystal River, Fla., September 28, 1937.
*38-804157, banded in Cape May County, N. J., July, 1938, by J. A. Gillespie, was killed in Juana Diaz, P. R., October 17, 1938.
*38-808244, banded in Cape May County, N. J., July 16, 1939, by J. A. Gillespie, was probably shot at Rio de Janeiro, Brazil, December 16, 1939.

PRAIRIE FALCON. *Falco mexicanus*

*A557904, banded at Carmangay, Alta., on June 4, 1933, by Dr. and Mrs. J. E. Horning, was caught in muskrat trap at Moscow, Kans., January 17, 1936.
*B671641, banded at Jackson, Wyo., on June 28, 1932, by O. J. Murie, was killed near Morris, Ill., January 26, 1933.
*34-624212, banded at Rosebud, Alta., on July 2, 1936, by W. R. Salt, was shot at Tagus, N. Dak., September, 1936.
*34-624220, banded at Rosebud, Alta., on July 2, 1936, by W. R. Salt, was trapped 50 miles northeast of Calgary, Alta., January, 1939.
*34-647047, banded at Mt. Dome, Siskiyou County, Calif., on June 6, 1937, by E. C. Aldrich, was shot at Hudson, Colo., about February 23, 1938.
*34-647049, banded at Mt. Dome, Siskiyou County, Calif., on June 6, 1937, by E. C. Aldrich, was found dead at Swift Current, Sask., about October 16, 1937.
*34-647052, banded at Mt. Dome, Siskiyou County, Calif., on June 6, 1937, by E. C. Aldrich, was shot at Horizon, Sask., about August 26, 1937.
*34-647053, banded at Mt. Dome, Siskiyou County, Calif, on June 6, 1937, by E. C. Aldrich, was killed near Woodland, Calif., February 10, 1938.
36-704756, banded at Stockton, Kans., on December 11, 1935, by R. H. Imler, was retrapped one-fourth mile away from original banding location on November 6, 1936.
*39-645638, banded at Jackson, Wyo., on June 10, 1939, by O. J. Murie, was killed by automobile at Carrollton, Mo., February 4, 1940.
*39-645641, banded at Jackson, Wyo., on June 26, 1939, by O. J. Murie, was shot four miles northwest of Ellendale, N. Dak., October 11, 1939.

DUCK HAWK. *Falco peregrinus*

*34-646470, banded at Russell, Mass., on May 21, 1938, by J. A. Hagar, was shot at East Berlin, Pa., December 30, 1938.
36-682956, banded at Key West, Fla., on November 1, 1939, by W. W. Demeritt, was shot at Habana, Cuba, about December 8, 1939.
*36-711653, banded at Mt. Tekoa, Woronoco, Mass., on May 23, 1936, by J. A. Hagar, was poisoned at Cobourg, Ontario, Canada, about September 30, 1936.
*36-711663, banded at Prescott, Mass., on June 9, 1936, by J. A. Hagar, was killed at Messick, Va., February 18, 1937.

36-733287, banded at Lower Souris Refuge, Upham, N. Dak., by C. J. Henry, was retrapped at Cedar Grove, Wis., September 18, 1937, by O. J. Gromme.
*37-626431, banded at Stockbridge, Vt., on June 9, 1937, by C. O. Proctor, was found injured at Oakley Depot, S. C., January 28, 1938.

PIGEON HAWK. *Falco columbarius*

*38-539109, banded at Lake Saganaga, Minn., on July 11, 1939, by James Struthers, was killed 28 miles from Houma, La., October 29, 1939.

SPARROW HAWK. *Falco sparverius*

*279949, banded at Huntington, Mass., on June 21, 1926, by A. A. Cross, was found dead at Newport News, Va., December 16, 1926.
*279950, banded at Huntington, Mass., on June 21, 1926, by A. A. Cross, was caught in trap at E. Newmarket, Md., March 19, 1927.
*528797, banded at Manchester, N. H., on June 14, 1938, by E. Goellner, was shot at Salisbury, Md., October 14, 1938.
*529723, banded at Plymouth, Mass., on June 2, 1928, by C. L. Hauthaway, was killed in crow trap at Freeport, Maine, about August 5, 1928.
*A443938, banded at Norristown, Pa., on June 11, 1932, by R. J. Middleton, was killed at Augusta, Ga., November 17, 1932.
*A462147, banded at Rosebud, Alta., on July 7, 1934, by W. R. Salt, was trapped at Crowfoot, Alta., April 26, 1938.
34-356903, banded at Bashaw, Alta., on June 15, 1935, by G. L. Cook, was killed at Abilene, Texas, October 10, 1938.
35-312052, banded at Saskatoon, Sask., on July 12, 1935, by W. M. Mowat, was shot at Flatonia, Texas, about February 5, 1936.
37-404413, banded at Tumacacori National Monument, Coolidge, Ariz., on July 6, 1938, by Louis R. Caywood, was shot at Imuris, Sonora, Mexico, on Bambuto River, February 13, 1939.
*38-321808, banded at Camden, N. J., on May 20, 1938, by L. R. Corn, was found, probably dead, at Bailey, N. C., March 1, 1939.

BARN OWL. *Tyto alba pratincola*

226386, banded at Vermillion, S. Dak., on May 23, 1934, by W. H. Over, was found dead 25 miles northwest of Lincoln, Nebr., about March 30, 1937.
*227998, banded at Buckeye Lake, Ohio, on July 7, 1928, by E. S. Thomas, was killed at Springfield, Ky., April 6, 1930.
*231886, banded near Knoxville, Tenn., on March 15, 1929, by H. P. Ijams, was shot at Eton, Ga., November 30, 1929.
*232155, banded at Horsham, Pa., on June 25, 1929, by Mrs. Florence C. Griscom, was rescued from a water tank on top of which it had a nest, at Rossville, Staten Island, N. Y., May 2, 1930.
*421542, banded at Buena Park, Calif, on May 4, 1927, by J. M. Robertson, was caught in rat trap at Gardena, Calif., February 28, 1930.
*655268, banded at Escondido, Calif., on April 10, 1931, by Fred N. Gallup, was shot at Orange, Calif, July 5, 1935.
*A719311, banded at Leetonia, Ohio, on June 7, 1936, by Paul A. Stewart, was caught in steel trap at Jamestown, N. Y., November 26, 1936.
B600771, banded at Chino, Calif., on November 22, 1930, by H. F. Koerber, was found at Riverside, Calif., May 2, 1939.
*B621422, banded at Toledo, Ohio, on May 23, 1936, by Louis W. Campbell, was killed at Bunkie, La., February 3, 1937.
*B621423, banded at Toledo, Ohio, on June 17, 1932, by Louis W. Campbell, was probably found dead in Lawrence County, Pa., February 14, 1933.
*34-625532, banded at Escondido, Calif, on April 24, 1935, by Fred N. Gallup, was caught in rabbit trap at Tijuana, Baja California, Mexico, July 4, 1936.
*B664413, banded at Leetonia, Ohio, on May 26, 1935, by P. A. Stewart, was captured at Sandy Ridge, N. C., October 5, 1939.

*B674205, banded at Chilmark, Mass., on July 3, 1932, by Geo. D. Eustis, was found frozen at North Arlington, N. J., February 13, 1936.

*34-640905, banded at Augustine Beach, Del., on May 21, 1939, by J. A. Gillespie, was killed at Sidney, N. Y., August 25, 1939.

36-715920, banded at Blue Island, Ill., on November 27, 1938, by K. E. Bartel, was captured in a house at Shaw, Miss., December 20, 1938.

*38-644785, banded at Chilmark, Mass., on July 30, 1938, by Roger Baldwin, was caught in steel trap at Mills Island, Ontario, November 21, 1938.

*38-659912, banded at Rye, N. Y., on October 4, 1938, by Irving Kassoy, was captured at Halifax, N. C., January 28, 1939.

SCREECH OWL. *Otus asio*

209300, banded at Ann Arbor, Mich., on February 27, 1934, by J. Van Tyne, was retrapped at same place January 17, 1938.

309305, banded at Lakewood, Ohio, on October 20, 1930, by E. C. Hoffman, was shot at Lakewood, Ohio, June 10, 1935.

325599, banded at Fruita, Colo., on March 7, 1927, by Mrs. Anna Benson, was retrapped at same place April 1, 1928, November 30, 1932, and June 30, 1934.

534994, banded at Wayland, Mich., on May 14, 1931, by Mrs. Mack Short, was retrapped at same place March 15, 1934.

A573009, banded at Winnipeg, Manitoba, on March 30, 1934, by J. P. Kennedy, was retrapped at same nest hole April 18, 1935 and April 4, 1936.

*34-522815, banded at Clemson, S. C., on May 10, 1935, by R. E. Ware, was shot at Anderson, S. C., December 4, 1935.

37-306423, banded at San Mateo, Calif., on December 28, 1936, by Richard Santee, was captured at same place November 11, 1937, sleeping in the nest box.

GREAT HORNED OWL. *Bubo virginianus*

*309387, banded at Branchport, N. Y., on April 24, 1933, by Verdi Burtch, was retrapped at Holcomb, N. Y., April 14, 1934.

A675691, banded at Komoka, Ontario, on September 5, 1933, by J. C. Higgins, was shot 20 miles southeast of London, Ontario, March 24, 1937.

*A709872, banded at Rosebud, Alta., on May 23, 1930, by W. R. Salt, was shot at Antelope, Mont., January 8, 1931.

A717013, banded at North Eastham, Cape Cod, Mass., on October 17, 1932, by O. L. Austin, was retaken at North Eastham, Cape Cod., Mass., December 5, 1938.

*A717502, banded at Beynon, Alta., on May 6, 1934, by W. R. Salt, was shot at Hesketh, Alta., May 20, 1937.

*A717510, banded at Rosebud, Alta., on June 12, 1934, by W. R. Salt, was shot at Rosedale, Alta., October 19, 1937.

*A717547, banded at Rosebud, Alta., on May 24, 1936, by W. R. Salt, was shot near Straw, Mont., October, 1936.

A718516, banded at Fairdale, N. Dak., on December 28, 1937, by Frank J. Vejtasa, was shot at Kylmore, Sask., December, 1938.

A730231, banded at Glenevis, Alta., on October 15, 1935, by Fred H. Pegg was found dead at Lethbridge, Alta., March 8, 1937.

SNOWY OWL. *Nyctea nyctea*

237343, banded at Fairdale, N. Dak., on February 2, 1931, by Frank J. Vejtasa, was shot at Moosonee, Ontario, October, 1936.

320600, banded at Fairdale, N. Dak., on March 11, 1931, by Frank J. Vejtasa, was shot 10 miles south of Wishek, N. Dak., November 27, 1931.

320679, banded at Fairdale, N. Dak., on October 20, 1931, by Frank J. Vejtasa, was shot at Wales, N. Dak., about March 1, 1934.

320681, banded at Fairdale, N. Dak., on November 15, 1931, by Frank J. Vejtasa, was found dead in trap at Crystal, N. Dak., January 7, 1933

BURROWING OWL. *Speotyto cunicularia*

*368148, banded at West Kildonan, Manitoba, on July 31, 1926, by A. R. Gresham, was shot at Spalding, Nebr., September 24, 1927.

*A544987, banded at Jamestown, N. Dak., on July 9, 1933, by Glenn L. Berner, was shot 10 miles west of Wichita, Kans., October 5, 1933.

A514900, banded at Benicia, Calif., on April 23, 1932, by E. A. Stoner, was recaptured, sitting on eggs, at same place April 23, 1933.

A514907, banded at Benicia, Calif., on April 23, 1932, by E. A. Stoner, was recaptured, sitting on eggs, at same place April 23, 1933.

A575106, banded at Northville, S. Dak., on June 7, 1932, by J. F. Brenckle, was caught in trap at Yoakum, Texas, February 13, 1940.

A575185, banded at Northville, S. Dak., on July 2, 1936, by J. F. Brenckle, was found wounded at Kenedy, Tex., November 11, 1936.

A575189, banded at Northville, S. Dak., on July 2, 1936, by J. F. Brenckle, was caught at England, Ark., about February 15, 1937.

BARRED OWL. *Strix varia*

A708824, banded near Glen Este, Clermont County, Ohio, on May 7, 1932, by C. J. Goetz, was found at Milford, Ohio, February 3, 1940.

B661127, banded at Montgomery, Ala., on October 21, 1932, by C. N. Hinderer, was killed by train near Montgomery, Ala., December 17, 1938.

LONG-EARED OWL. *Asio wilsonianus*

*A573140, banded at Winnipeg, Manitoba, on July 3, 1936, by J. P. Kennedy, was shot at Macy, Nebr., December 6, 1936.

B661927, banded at Williamston, Mich., on April 27, 1932, by P. F. English, was caught in trap about February 15, 1936, at Gladstone, Va.

*C629579, banded at Rosebud, Alta., on July 4, 1933, by W. R. Salt, was recovered at Monowi, Nebr., March 3, 1934.

*37-642104, banded at Des Lacs National Wildlife Refuge, Kenmare, N. Dak., on June 16, 1938, by Seth H. Low., was recovered at Winner, S. Dak., November 28, 1938.

*36-714117, banded at Des Lacs National Wildlife Refuge, Kenmare, N. Dak., on June 9, 1937, by Seth H. Low, was killed at Regina, Sask, August 21, 1937.

SHORT-EARED OWL. *Asio flammeus*

*36-733801, banded at Lower Souris National Wildlife Refuge, Upham, N. Dak., on June 21, 1938, by C. J. Henry, was trapped 7½ miles southwest of Ontario, Ore., November 27, 1938. The band was sent.

*38-637192, banded at Bombay Hook National Wildlife Refuge, Milford, Del., on May 24, 1938, by H. Buckalew, was found dead at Grand Anse, New Brunswick, September 6, 1938.

*38-637195, banded at Bombay Hook National Wildlife Refuge, Milford, Del., on May 25, 1938, by H. Buckalew, was shot at Kemp, Ohio, November 19, 1938.

SAW-WHET OWL. *Cryptoglaux acadica*

37-501436, banded near San Mateo, Calif., on May 18, 1937, by Richard C. Santee, was recaptured, sitting on eggs, at same place, April 30, 1938.

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PHOTOPERIODISM AND MIGRATION

By MARIE ROLLO

MANY theories have been advanced for the migration of birds but each of these is open to objections. While one factor may seem to control the migration of several species it breaks down when applied to others. This has led to the assumption that migration is an inherited instinct and is performed now by birds without any evident stimulation, and that the original causes for migration were not the same for all species (Lincoln, 1939). However, there is so much regularity, at least in true north and south migration, that it seems that one factor in the environment must be responsible, or, at least, supreme in stimulating the predictable arrival and departure of birds. If several factors were involved or if there was no active stimulation there would not be as much of a pattern in the migratory movements of all birds. An acceptable theory must hold for all species and for all details, and in meeting these requirements, of all the theories advanced, the one of photoperiodism seems to offer the most hope.

Eifrig (1924) was the first to point out that the gradual change in daily light period was the only environmental factor that varied regularly enough to account for migration, but many authorities have not given this theory much weight. Among their objections are the following: Trans-equatorial migrants commence their northward journey while the days are actually decreasing in length. Some birds leave for the south when the daylight is still increasing and the longest day has not been reached. Rowan found that northward migration was the result of stimulation of the gonads by gradually increasing light periods but Bissonnette called attention to the fact that birds often reach their breeding grounds before their gonads are fully distended. It may be that we have not had a clear understanding of how a bird responds to this factor of the environment. Many experiments have been done recently in the field of photoperiodism by the botanists and zoologists from which a few simple principles can be drawn which will provide us with a framework that will explain these seeming inconsistencies and make these objections disappear. Rowan (1925) demonstrated that increasing daily light periods stimulated enlargement of the gonads and northward migration. Bissonnette (1930) confirmed this stimulatory action, and demonstrated the effects of various intensities and wave-lengths. Benoit (1936) and others have shown that light is effective through the hypophysis and that the hypophysis in turn stimulates the gonads. Garner and Allard (1920) have shown that plants respond to a daily light period which varies with the species and sometimes with the variety, and that

this response is inherited in the germ plasm and is passed on in the regular Mendelian way in hybrids.

In my own experiments (Brown and Rollo, 1940, and other experiments, unpublished) on weaver finches (*Pyromelana franciscana*) increasing the daily light period gradually was not as effective in producing the nuptial plumage as giving them optimum daily light period from the start. When weavers received ten, eleven, twelve, thirteen, fourteen, sixteen and eighteen hours of light daily, those on a thirteen and fourteen-hour period came into color first. An eighteen-hour period retarded the appearance of nuptial plumage as much as an eleven-hour period. At nine hours, they remained in eclipse plumage.

Paradise whydahs (*Steganura paradisaea*) assumed nuptial plumage on a twelve-hour period, but went into eclipse plumage on both a ten and a sixteen-hour period. A daily light period above as well as below the optimum did, not only, not stimulate but actually retarded the appearance of nuptial plumage. Each of three genera used responded to a different optimum daily light period. On dissection a correlation was found between the state of the gonads and the appearance of nuptial plumage, so that nuptial plumage can be taken as an indication of sexual activity in this species. The following principles might be drawn from these experiments and applied to migration:

1. Plants and animals inherit their ability to respond to a certain daily light period.
2. The optimum period varies with the species and sometimes with the variety.
3. Optimum period is more effective than gradually increasing and decreasing light periods.
4. Too long a period makes for regression as well as too short a period.
5. Light is effective through the hypophysis.

Birds in their response to light can be compared to plants. In the first stage of a plant's life, humidity and temperature are most important, and this is true in a fledgling's life. From the appearance of the first shoot in a plant, to the reproductive stage, however, light is of utmost importance, and temperature and humidity are only secondary. This is true of birds in the same stage. Bissonnette has shown that it is not the extra food consumption but the effect of the light itself that stimulates reproductive activity. Bishop weavers on a fourteen-hour light period can go for forty-eight hours without food and show no ill effects but will starve to death in four and a half hours on a nine-hour light period.

There is this difference between birds and plants: plants without optimum daily light period fail to mature and reproduce, while birds, with their ability to travel, migrate to where they can get

optimum period. As in plants, the optimum period varies with the species and variety, and the length or migration in birds varies accordingly. As a general rule long-day plants are found in the extreme north and the equivalent in birds is found in the Arctic Tern which migrates from the Arctic to the Antarctic. Near the equator we have the short day and ever-blooming type of plants, and we have birds that migrate just a few degrees and some that breed throughout the year. Bishop weavers and whydahs that ordinarily have a seasonal change of plumage have, in my experiments, been kept in nuptial plumage for almost two years on an optimum light period and can be compared with the everblooming type of plant.

Bissonette and Rowan have already shown that increase and decrease in daily light period need not correspond with that in nature. If we now consider that it is not this increase and decrease in period that stimulates birds to migrate but a search for optimum period, we can understand why trans-equatorial migrants commence their northward journey while the days are decreasing in length. They migrate to the latitude that has a light period to which they have inherited the ability to respond. Too long a light period made for regression in my experiments. This will explain why birds sometimes leave for the south when the daily light period is still increasing and the longest day has not been reached in the north because the longer light period is above the optimum for their need at that time. The fact that light is effective through the hypophysis instead of the gonads explains why birds often reach their breeding grounds before their gonads are fully distended, for while the gonadal development is part of the picture it is probably not the means of control of migration. A correlation is found between plumage changes, migration and reproduction. If the hypophysis controls reproduction and plumage changes it seems reasonable to assume that it is also the means of control of migration.

Other factors enter into migration but not in a haphazard way. Light period comes first. Moreau has pointed out that birds migrate south over the Sahara desert in a straight line and in equal numbers across its entire breadth, and that they may be found in hundreds, starved to death, not being able to reach the other side, but they do not follow the Nile where food and water are available.

From this point of view, the theory of photoperiodism seems to hold for all species in their true migration.

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NEW BIRD-TRAPPING DEVICES

By H. M. BRUNDRETT

THE devices hereinafter described have provided efficient methods of capturing birds of various kinds for the purpose of studying the ectoparasites with which they are infested and also for determining the extent to which they serve as intermediate hosts for parasites of domestic animals. It is believed that the devices will be useful in other biological studies where the trapping of birds is necessary.

MODIFIED "FIGURE 4" BIRD-TRAP TRIGGER

The usual "figure 4" bird-trap trigger has a number of undesirable features, especially when the traps are used extensively. First, the single vertical post of the trigger is an inadequate support for the trap and other trigger parts. The support is not steady enough to prevent the trap from slipping or falling, especially in a strong breeze. Second, the base of the post, which is usually small, sinks, especially if the ground is soft. Here again the trap may be sprung, or the trigger rendered inoperative. Last, and most important, the trigger bar of the ordinary "figure 4" trigger is not equally sensitive to light pressure from all directions.

The improved trigger was designed to remedy the above-mentioned faults. The single support post of the usual type is

replaced by a double post attached to a platform. This double post and platform construction insures a steadier support and allows the use of a more sensitive trigger head. The trigger was made sensitive to light pressure from all movements in a vertical plane by prolonging a central rectangular piece one-eighth inch in front of the body of the trigger head. Sensitiveness to pressure in a horizontal plane was increased by driving the stem of a nail through the head of the trigger at the center immediately behind the rectangular prolongation.

THE OPERATION OF THE MODIFIED "FIGURE 4" BIRD-TRAP TRIGGER.—The accompanying drawings show the trigger head (fig. 2), the trigger in side view (fig. 1), and the trigger head in perspective (fig. 3). A photograph of the trap in position is shown in figure 4. The parts as lettered on the drawings (figs. 1 and 2) are: A, trigger bar; B, latch bar; C, trap bar; D, support post; E, posts; F, trigger head; G, base; and H, head bar (cross bar).

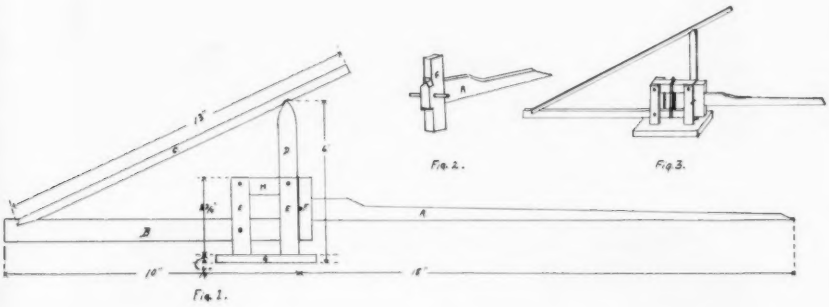

Figure 1—Details of modified "figure 4" bird-trap trigger.
Figure 2—Details of the trigger head.
Figure 3—Drawing (in perspective) of the modified trigger.

When set in position the trap rests upon the upper end of C, which rests on D. The lower end of C fits in a slot at one end of B. Trigger head F is notched as shown in figure 2, and is held in position by placing the notched prolongation between the ends of B and H. Pressure is exerted upon the trigger head by B, which is pivoted on a pin through E and is actuated by a rubber band around B and H. The central prolongation of F causes the trigger to trip quickly when acted upon in a vertical direction, while the pin through F causes it to trip when acted upon in a horizontal direction. The sensitiveness of the trigger is changed by modifying

the size and shape of the top notch in trigger head F. Bait is placed under A, which should lie in a horizontal position under the trap about $1\frac{3}{4}$ inches from the ground.

For satisfactory operation the trigger should be made of well-seasoned light wood and thoroughly varnished with a good waterproof varnish. This prevents swelling and sticking when it becomes wet with dew or rain.

MAZE BIRD TRAP

The maze bird trap has been used very successfully in trapping

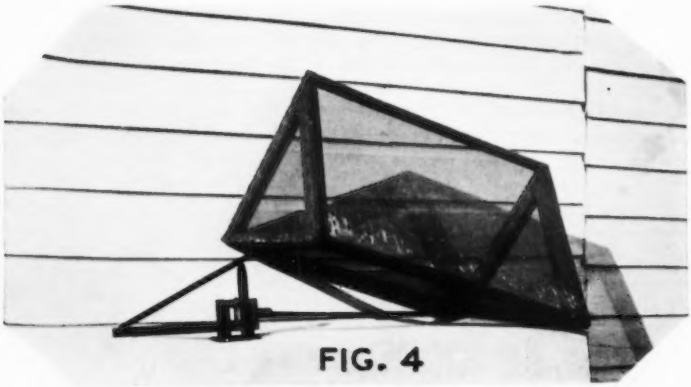

FIG. 4

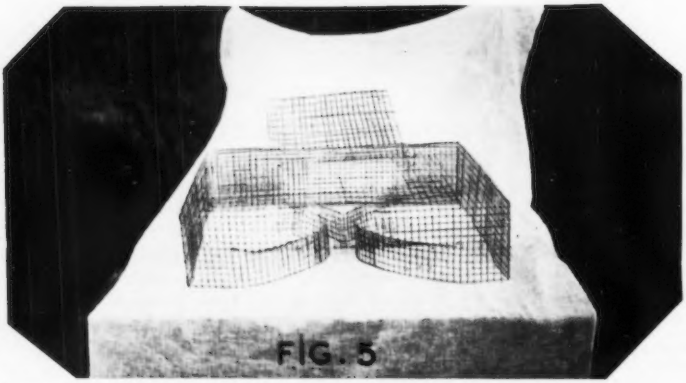

FIG. 5

Figure 4—Modified "figure 4" trigger and bird trap in position.
Figure 5—Maze bird trap in normal position.

Quail, Cardinals, Meadowlarks, Towhees, Brown Thrashers, English Sparrows, White-throated Sparrows, Eastern Song Sparrows, Swamp Sparrows, and Eastern Field Sparrows.

The trap is constructed of half-inch mesh hardware cloth shaped to form a shallow box. The entrance to the simple "Y" maze is placed in one side of the trap. The birds pass into the trap, but once inside they tend to remain close to the outer walls, and in so doing fail to find the central exit.

The dimensions of the trap are: Length, 2 feet; breadth, 2 feet; height, 6 inches. Dimensions of maze: Length, 12 inches; height, 3 inches; width of mouth, 15 inches; width of neck 2½ inches.

A small door is cut in the top, through which the hand may be inserted and the birds removed.[1]

Figure 5 shows the trap in its normal position but with the door open. The drawing (fig. 6) shows the trap in an inverted position.

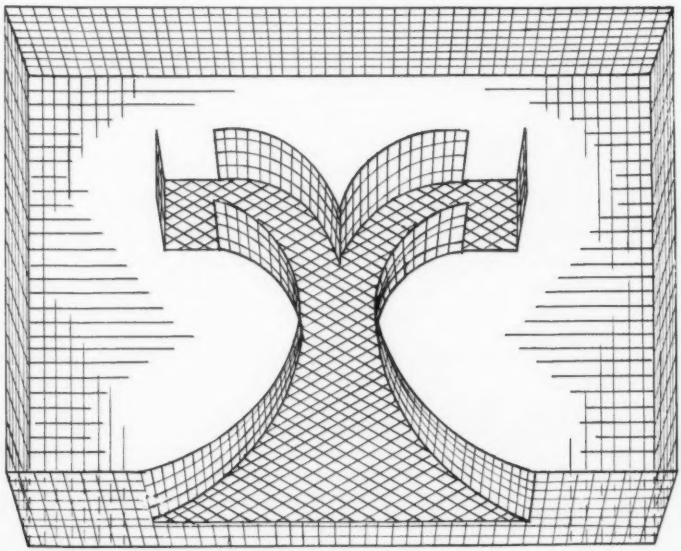

FIG. 6.

Figure 6—Drawing of the maze bird trap (inverted position).

[1] A door near one corner through which the birds can be driven into a gathering cage would probably be more convenient. Editor.

When in use the lower edges of the trap and maze rest upon the ground.

To attract the birds into the trap, a grain bait is scattered about on the ground in the trap, in the maze passage, and a little outside the entrance. The operation of this trap is continuous, making it possible to catch a considerable number of birds at one time.

Bureau of Entomology and Plant Quarantine, United States Department of Agriculture.

SOME INTERESTING RECORDS FROM BIRDS BANDED AT AVERY ISLAND, RETAKEN DURING THE WINTER OF 1940–1941

By E. A. McILHENNY

WHEN one has handled yearly as many birds as I have and affixed an identifying metal band to each one over a thirty-year period, the differences in construction of each year's bands (and there are differences prior to 1938) are quite noticeable. I am now referring to No. 6 bands. Each series of bands issued by the Biological Survey, now the Fish and Wildlife Service, has stamped on each band besides the serial number a prefix letter or number, indicating the year of issue.

Prior to 1939, there was a marked yearly difference in the No. 6 Band, or in the metal contained in this particular size, or in its numbering, as put out by the Biological Survey, now the Fish and Wildlife Service. Knowing these differences, it is easy for one to identify No. 6 bands of the different series by their peculiarities.

Bands bearing an identifying prefix are not necessarily all used in the year they were issued. "A" band was issued in 1930, and again in 1934. "B" band was issued in 1931 and 1932; "C" in 1934; "34" in 1934 and 1935, and "38" in 1937 and 1938.

As before stated, these references are all to No. 6 bands, which is the size used on all medium sized wildfowl, such as Coots, Pintails, etc.

"A" band is easily distinguishable by the fact that it is not only much shorter than "B", but is a harder alloy, and susceptible of high polish.

"B" is one of the softest bands yet issued. They were a long, slender band, much longer than "A", and were affixed at my station to migratory wild fowl in 1931 and 1932. I recover more illegible "B" bands than of any other type.

The "C" band again was different. This band is much longer than either "A" or "B", and is also narrower. "C" has worn a little better than "B".

"34" is the shortest and broadest No. 6 band issued up to the year 1934. The numbering on this band is also considerably larger than on any other previously issued band. This band seems to be softer than bands previously issued, as the numbers wear off more rapidly.

"36" and "38" are both the same length as "34", but are somewhat narrower, and are of very much lighter metal, and the numbers are very much smaller. Neither of these bands wore well.

Knowing the differences both in size and material in the different types of bands, I have no difficulty in determining the year the bands were affixed to birds at my station, and by keeping a record of birds from which the illegible bands were removed, it is easy to know, for instance, that a "B" band taken from a male Scaup was put on the bird in 1931 or 1932, but when the band is illegible, it is quite impossible to make a definite statement as to which Scaup, of the many hundreds banded during the time, this particular band was used on. Therefore, it is easy to identify the year the bird was banded, but when the number of the band is illegible, the identical bird cannot be determined.

It is unfortunate that a material cannot be furnished by the Fish and Wildlife Service that would stand up better under the hard wear given the bands by swimming birds.

During the past year, a number of birds were re-trapped bearing old copper bands, on which the numbers and letters were completely obliterated by wear. As none of these bands have been used since 1930, it is evident that we are losing many valuable records by not being able to decipher the numbers on these bands.

I had made a few hundred bands, size No. 6, from stainless steel, and, during 1937 and 1938, attached them to one of the legs of

ducks, on the other leg of which I placed an aluminum band of the then Biological Survey. On re-trapping ducks bearing the two types of bands, I have found that the stainless steel band showed much less wear than the aluminum band, and the lettering, although not so deeply stamped, was entirely legible, while the lettering on the aluminum band was badly worn.

My wild fowl banding station at Avery Island has been in continuous operation for just thirty years, and my banding records go back to January, 1912, or eight years before the Biological Survey took over the supervision of bird banding, which had been begun by the American Bird Banding Society, of which I was an early member.

During the thirty years I have been actively engaged in banding migratory birds, I have trapped and affixed numbered and recorded metal bands on the legs of 286,743 individuals.

Through long experience, I have developed quite an elaborate system of traps for capturing the different species of birds wintering in southern Louisiana. These traps are permanent wire-covered enclosures, some on land and some in water. The traps are baited daily, and the birds removed and banded twice daily. I have working for me a crew of four men who have been trained in this work, and who, through long association with the work, have become very efficient.

When the birds are taken from the traps, they are sorted as to the species, and sex, placed in assembling boxes, and taken to the banding station, where the affixing of the bands and recording is done by me. The system I have developed enables me to band a large number of birds in a short time, for I frequently handle more than five hundred ducks in one hour.

Many birds, but especially migratory wildfowl, return each winter to that section of the south where they made their home during the first winter of life. This homing instinct has been demonstrated by the thousands of birds retaken in my banding traps. I now annually record more than 2,000 retaken at Avery Island which have made one or more migrations north and south after being banded. Of course, each return retrapped is recorded, but only after one complete round trip migration.

For many years, I have retrapped quite a number of banded birds on which the identifying marks on the bands were either completely worn away or so badly worn as to be illegible.

Failure to identify a particular bird, due to a badly worn band, always disappoints me, as I feel a valuable link in the life span of that individual bird has been lost. From time to time, I have sent numbers of these badly worn bands to the Biological Survey, in the hopes they had some means by which the worn numbers could be brought out. Nothing, however, came from their promises to

decipher the bands, so several years ago I ceased saving the worn bands, and after failure to decipher them here, destroyed them.

At the end of the banding season of the winter 1940–1941, I found I had accumulated 106 illegible bands. Remembering that Mr. Frederick C. Lincoln, of the Bureau of Biological Survey, had written me some years ago that there was an acid formula which, if the worn bands were dipped in, would, through macro-etching, often clear and make legible the worn numbers on the metal, I wrote him on March 17, 1941, asking for the formula.

On March 21, 1941, Mr. Lincoln wrote me in part as follows:

> "The American Society for Metals recommends several solutions for the macro-etching of aluminum. The one that we have been using is made up as follows:
>
> Hydrofluoric Acid.....15 ml.
> Hydrochloric Acid.....45 ml.
> Nitric Acid.....15 ml.
> Water.....25 ml.
>
> "The bands are first cleaned in absolute alcohol, dried, and then immersed in the etching solution for a few seconds. A wash in running water, a dip into alcohol, and a drying of the band completes the operation."

I at once contacted several druggists in an attempt to have this formula compounded, as I was anxious to try it. It was quite some time before I could induce anyone to put the formula together, but finally got one of the druggists of New Iberia to agree to compound it. Some weeks passed and the prescription was not received, so I telephoned, and was told that, after making up the formula and putting it into a glass bottle, the combined acids had damaged the glass. I then suggested that a second batch be compounded and put into an earthenware jug. This was done and duly delivered to me.

A few days later, I followed instructions and put the mixture in operation, giving the acid bath to one hundred and six illegible bands accumulated during the winter of 1940–1941. All of these bands were made of aluminum or aluminum alloy. Sixty-four of the one hundred and six bands treated were made legible, and forty-two remained illegible, due to their badly worn condition. On many of the bands, the numbers were brought out nicely, while on others, in order to decipher the numbers, it required the use of a magnifying glass and the turning of the band so that a strong light would strike at it different angles, as the light angles frequently made a number legible which, if looked at flat, was illegible.

Many of the bands treated were so badly worn that no part of the number could be deciphered, while on others two or three of the figures could be read, but not the whole number. The acid bath did not help the old copper bands, which was a disappointment, as birds wearing them had been banded prior to 1930, and a decipher-

ing of the copper band numbers would have added some interesting records.

In handling this acid bath for deciphering worn bands, great care must be exercised. The acid is so strong that severe burns result if it touches flesh. It will burn through any fabric. It will destroy glass or metal. After mixing, store in earthenware.

Of the sixty-four bands, the numbers of which were made legible by the acid bath:

1 was put on in 1930	12 were put on in 1934
2 were put on in 1931	6 were put on in 1935
32 were put on in 1932	1 was put on in 1936
9 were put on in 1933	1 was put on in 1937

A complete list of the bands made legible by the acid bath follows:

Serial Number	Species	Date Banded	Date Retaken
A-585544	Coot	1/19/34	12/30/40
A-586608	Ring Neck Drake	1/26/34	11/16/40
A-586821	Ring Neck Drake	1/31/34	12/12/40
A-586976	Pintail Hen	1/31/34	12/10/40
(1) A-587514	Louisiana Heron	7/13/34	4/14/40
(2) A-658502	Pintail Drake	2/13/30	11/16/40
B-630247	Pintail Drake	12/ 7/31	11/20/40
B-630208	Lesser Scaup Drake	12/ 7/31	12/14/40
B-631283	Lesser Scaup Drake	1/ 1/32	12/16/40
B-631297	Lesser Scaup Drake	1/ 1/32	11/29/40
B-631296	Lesser Scaup Drake	1/ 1/32	12/20/40
B-631411	Lesser Scaup Drake	1/ 1/32	11/28/40
B-631485	Lesser Scaup Drake	1/ 1/32	11/30/40
B-631554	Lesser Scaup Hen	1/ 1/32	11/30/40
B-631284	Lesser Scaup Drake	1/ 1/32	12/16/40
B-631590	Lesser Scaup Hen	1/ 1/32	12/30/40
B-631907	Pintail Drake	1/ 5/32	12/10/40
B-632159	Lesser Scaup Drake	1/ 8/32	12/30/40
B-632287	Lesser Scaup Drake	1/ 8/32	12/ 1/40
B-632359	Lesser Scaup Hen	1/ 8/32	12/15/40
B-632407	Coot	1/ 8/32	12/29/40
B-632368	Lesser Scaup Hen	1/ 8/32	12/16/40
B-632439	Pintail Drake	1/ 8/32	12/18/40
B-632490	Pintail Hen	1/ 8/32	12/16/40
B-632547	Lesser Scaup Drake	1/ 8/32	12/27/40
B-632565	Lesser Scaup Drake	1/ 8/32	12/18/40
(3) B-632574	Lesser Scaup Drake	1/ 8/32	12/ 2/40
B-632576	Lesser Scaup Drake	1/ 8/32	12/ 6/40
B-632653	Lesser Scaup Drake	1/ 8/32	11/20/40
B-632672	Lesser Scaup Hen	1/ 8/32	12/28/40
B-632787	Lesser Scaup Drake	2/ 3/32	12/13/40
B-632964	Lesser Scaup Drake	2/ 3/32	12/ 6/40
B-632982	Lesser Scaup Drake	2/ 3/32	12/ 6/40
B-656062	Pintail Hen	2/ 3/32	12/ 2/40
B-656155	Pintail Drake	2/16/32	12/11/40
B-656854	Lesser Scaup Drake	2/27/32	11/16/40
B-657386	Coot	11/ 9/32	12/ 3/40

B-657922	Lesser Scaup Hen	11/14/32	12/19/40
(4) B-696665	Pintail Hen	12/ 4/32	12/11/40
B-697695	Coot	12/20/32	12/27/40
B-698327	Coot	1/19/33	11/21/40
C-606542	Pintail Hen	1/25/33	11/ 3/40
(5) C-606877	Pintail Drake	1/25/33	11/23/40
C-607353	Coot	2/16/33	11/ 4/40
(6) C-607454	Pintail Drake	3/ 4/33	12/17/40
(7) C-608549	Coot	11/23/33	12/26/40
(8) C-607600	Pintail Drake	3/ 4/33	11/26/40
C-608147	Lesser Scaup Drake	11/11/33	11/16/40
C-608770	Pintail Hen	11/23/33	11/16/40
34-550753	Pintail Drake	1/ 9/35	11/28/40
34-550830	Lesser Scaup Drake	1/ 9/35	11/26/40
34-552352	Ring Neck Hen	2/16/35	12/10/40
(9) 34-547523	Pintail Drake	11/13/34	12/28/40
(10) 34-552446	Pintail Drake	2/ 4/35	12/ 1/40
34-552630	Pintail Drake	2/21/35	11/17/40
34-548236	Pintail Hen	11/20/34	11/29/40
34-548282	Lesser Scaup Drake	11/20/34	12/18/40
(11) 34-552747	Pintail Drake	2/21/35	11/28/40
34-549119	Lesser Scaup Drake	12/ 6/34	11/20/40
34-549378	Pintail Drake	12/12/34	12/12/40
34-549486	Lesser Scaup Hen	12/12/34	11/27/40
34-549510	Lesser Scaup Drake	12/12/34	12/ 1/40
(12) 36-690279	Coot	12/31/36	1/11/41
38-630073	Lesser Scaup Drake	12/25/37	12/20/40

Twelve of these retakes are of special interest, as shown by the numbered notes, and a number of them have been recorded as retakes at Avery Island four or more years.

NOTES

(1) A-587514 This band was so badly worn that it was removed and replaced with 40-644954.

(2) A-658502 This bird was banded 2/13/30, and shipped on the day banded by express to Moise, Montana, and there liberated.

(3) B-632574 This bird was retrapped at Avery Island 1/31/35 and killed at Avery Island 12/2/40.

(4) B-696665 This bird originally wore band A-666073, banded 12/29/30. This band was removed because of its worn condition 12/4/32. This bird was shot in the vicinity of Avery Island 12/11/40.

(5) C-606877 This bird was banded 1/25/33, and retrapped at Avery Island 12/12/33, 2/21/35, 2/4/39, 12/2/39 and killed in the vicinity of Avery Island 11/23/40.

(6) C-607454 This bird was originally banded 3/4/33, and shipped on the day banded by express to Cambridge, Maryland, and there liberated. Retrapped at Avery Island on 11/20/34, 12/31/36, 12/25/37, and 12/16/39. Killed in the vicinity of Avery Island 12/17/40.

(7) C-608549 Banded 11/23/33. Retrapped at Avery Island on 1/25/35, 1/11/36, 4/6/38, and 12/3/38. Killed in the vicinity of Avery Island 12/26/40.

(8) C-607600 Banded 3/4/33, and shipped on the day banded by express to Voltage, Oregon, and there liberated. Retrapped at Avery Island 12/20/35, 12/5/36, 12/24/38, and killed in the vicinity of Avery Island 11/26/40.

(9) 34-547523 Banded 11/13/34. Retrapped at Avery Island 11/15/36, 11/13/37, and killed in the vicinity of Avery Island 11/28/40.

(10) 34-552446 Banded 2/4/35, and shipped the same day banded by express to Berkeley, Calif., and there liberated. Retrapped at Avery Island, La. 2/6/37, 12/16/39, and killed in the vicinity of Avery Island 12/1/40.

(11) 34-552747 Banded 2/21/35, and shipped same day as banded by express to Cambridge, Maryland, and there liberated. Retrapped at Avery Island 12/23/39. Killed in the vicinity of Avery Island 11/28/40.

(12) 36-690279 Banded 12/31/36. This bird was retrapped at Avery Island 1/11/41, and band was so badly worn that it was replaced by band 41-616741.

Avery Island, Louisiana.

GENERAL NOTES

A Barn Owl's Record.—Barn Owl B 674404, one of four nestlings banded May 11, 1936 at Chilmark, Marthas Vineyard, Mass., by George D. Eustis, furnishes an interesting bit of life history. This bird, a female, chose Hunt's Point, Bronx, New York City, as a nesting site, and three broods of her young have been banded there by Irving Kassoy. Its mate was banded on May 16, 1938 as 38-644743 and on May 19 the five young were banded. On June 5, 1938, this female was captured and band 38-644737 added. On July 29, 2939 the bird was again caught on its nest and its five young banded. Only about four months later, December 5, 1939, this bird was again caught on its nest and three other young banded. Apparently the male bird was caught only once.

Two broods within six months seems to be quite unusual. I have been able to find only two references to more than one brood a year. Forbush (Birds of Massachusetts and other New England States, vol. 2, p. 190) says "One brood yearly, sometimes two, in the south." New York City can hardly be called south. Bendire (Life Histories of North American Birds, vol. 1, page 326) gives the following instance: "Mr. F. Stephens informed me that a pair hatched a brood of six young in January, 1885, at St. Isabel, Calif., and that on March 25, the bird was sitting on a second set of eggs." While this was probably the same bird, in the absence of banding it cannot be proved.

Of the thirteen young banded we have as yet heard from only one, 38-644738, of the first-brood, which was found dead on April 29, 1939, at Ambler, Pa., a few miles north of Philadelphia.—May Thacher Cooke, U. S. Fish and Wildlife Service, Washington, D. C.

The Age of the Black-capped Chickadee.—In his interesting "Winter Studies of Color-Banded Chickadees" (*Bird-Banding*, vol. XII, pp. 49–67) George J. Wallace concludes that the Chickadee is a "comparatively short-lived species." He seems to base his conclusion on the assumption that the thirteen records of Chickadees known to have lived more than five years, published by me in 1937 (*Bird-Banding*, vol. VIII, pp. 52–65) were all there were in the return files. This series of records represented "only a cursory study of the returns that have been received in the last three years" [1934, 1935, and 1936]. Since the above

article appeared, a hasty check of the returns has been made and at least eighty records of Chickadees that lived to be five or more years old have been found; several were past seven.

Up to July 1, 1940 about 3,400 return records for Chickadees had been received, but it is doubtful whether these represent more than 3,000 birds since many have returned more than once. (To ascertain the exact figure would require an elaborate check.) These records represent the returns from 21,900 birds banded, more than 13½ per cent, which is quite high. The 80 or more birds known to have lived to at least five years of age represents more than a third of one per cent of all the Black-capped Chickadees banded.

Species that attain full adult plumage at the post-juvenile molt, and are banded principally in winter, are unsatisfactory subjects for longevity studies since it is impossible to know the real age of the bird at the time of banding. It is a fair assumption that the individuals that have returned for five or six years were birds of the year when banded, but it has required five years or more to learn that. It can also be assumed that many of the birds that did not return after one or two years had already lived much of their life-span at the time they were banded.

Before banding returns became available, my impression was that six or seven years was considered to be "ripe old age" for wild birds, at least for the Passerines. It now seems that some of the theories on this subject may have to be revised.—May Thacher Cooke, U. S. Fish and Wildlife Service, Washington, D. C.

Observations on Intestinal Worms in a Young Robin, (*Turdus m. migratorius*).—On July 5, 1941, an immature Robin, *Turdus m. migratorius*, was trapped and banded by Beecher S. Bowdish at Demarest, N. J. Since the bird was able to fly, being apparently "on its own" at that time, its age was not estimated, but it could not have been more than about two months old and might not have been more than one. A week later the Robin re-entered the trap and died while being examined, whereupon Mr. Bowdish sent the bird to me for post-mortem investigation.

While the cause of death was not remarkable, being the result of physical injuries sustained in some unknown manner, the incidental finding of five species of intestinal worms in so young a bird was of considerable interest.

Securely anchored to the duodenal mucosa there were about a dozen small Spirurid nematode worms, which in the opinion of Dr. Norman R. Stoll were immature. Throughout the intestinal tract were many mature individuals of a small species of tape worm, while a single large adult tape worm of another species was found in the mid-intestinal region. Several large adult Ascaroid nematode worms were scattered along the entire tract. Finally there were four Acanthocephala near the hindgut, their probosces buried in the mucosa.

The point of chief interest in these findings is that the majority of worms was already sexually mature and producing eggs. Not that it would be surprising to find mature parasites two months—or even one month—after the introduction of larval forms into a definitive host, but the fact remains that this bird must have acquired its internal parasites at a very early stage of its life. What, in fact, was to prevent parasitism from resulting after the very first meal?

With mammals this is not nearly so true, inasmuch as worms—at least—can not be transmitted through direct suckling. But even the tiniest insect, delivered to a newly-hatched Robin, may contain encysted stages of tape worms and Spirurids. Later, when Earthworms are included in the diet, Ascaroid eggs will be conveyed to the fledgling's intestine in the soil contained in the Earthworms. The life history of most Acanthocephala is not surely known, but this group is also disseminated by invertebrate vectors that are eaten by birds.

Infestation of young birds is therefore probably early and multiple in most cases. The fact that death rarely ensues as a direct consequence of such parasitism indicates that even the most fragile fledgling is well equipped by nature to

cope with its guests at the table. As for the latter, their rôle in the above story is as illuminating to the naturalist as are the Robin-considerations involved.—C. Brooke Worth, Rockefeller Institute for Medical Research, Department of Animal and Plant Pathology, Princeton, New Jersey.

An Eastern Snow Bunting in it's Eighth Winter.—On February 22, 1934, I trapped and banded a Snow Bunting (*Plectrophenax nivalis nivalis*), at my bird banding station near McMillan, Mich., to which I gave band number L 73527. I have retaken the bird on March 7, 1934; January 13, February 3, 15, March 1, 4, 16, 1936; January 27, 29, 30, February 2, 16, March 5, 6, 1938; February 15, March 3, and 4, 1941.

This bird is now in its eighth winter, and in the belief that it might be the longest longevity of this species, I wrote the Fish and Wildlife Service at Washington, D. C., and Mr. F. C. Lincoln replied in a letter dated March 6, 1941, that "Examination of our other Snow Bunting returns shows that you are correct in assuming that yours is the best longevity record for that species." We are safe in noting this bird to now be in its eighth winter, and through my studies on the plumage of this species, I feel sure that it is at least in its ninth winter.

Through my studies, I have not yet found a Snow Bunting with the primary coverts mostly or nearly all black, the outer web of the greater coverts half or more black, nor the inner (9th) pair of primaries all white, and not more than half, if any of the secondaries all white, when retaken in a following winter after banding. With this bird on the date banded, there was light blackish on the end of all but the first pair of primary coverts; the inner pair of primaries and all secondaries were all white; there was no black on exposed parts of any greater coverts, and there was light rusty-like on the middle of outer web of the 2nd and 3rd pairs. The end of the middle and lesser coverts was light rusty-like. On its return date of January 13, 1936, there was a little black on the end of 2nd, 3rd, 4th, 5th, and 6th pairs of primary coverts; and thus, the end of the 7th, 8th and 9th pairs had become white. On the return date of January 27, 1938, the 6th pair of primary coverts had no black on the end. On the return date of February 15, 1941, I found that only the 4th pair of primary coverts had black on the end and that was only on the shaft; the black on the end of the 2nd and 3rd pairs was replaced with light rusty. The end of the middle and lesser coverts were rusty, and this color was extended to the other greater coverts, that is, on the outer web. The 8th right primary was all white.

Also from this bird, are a few notes on the moult, which may be of interrst. These are: March 7, 1934. Some new feathers partly grown on chin and some new auriculars. March 16, 1936. Much new plumage partly grown on chin, throat, auriculars and both tibiae. March 5, 1938. Moulting on chin, throat, lores, malar region, auriculars and tibiae.

Up to this time, I have banded 916 Snow Buntings, and from these I have 918 repeat records, 91 returns, and 8 recoveries.—Oscar McKinley Bryens, R.F.D. No. 1, McMillan, Luce County, Michigan.

RECENT LITERATURE

Reviews by Margaret M. Nice

BANDING

1. Report of the Bird-Ringing Committee: Progress for 1940. A. L. Thomson. 1941. *Brit. Birds*, 35 : 9–14. The Fourth Annual Report of the Bird-Ringing Committee of the British Trust for Ornithology shows a total of 21,182 birds ringed in 1940, nearly 15,000 being trapped birds and 6,000 nestlings. Economy has to be observed in the use of rings. "Further supplies of aluminum cannot be expected during the war." "Valuable help in reporting recoveries has been given by local police, as a result of an official circular to Chief Constables." Birds with foreign rings "have been the subject of some suspicion."

2. Results of Ringing Duck. General Survey of Data from all Sources. A. L. Thomson. 1941. *International Wildfowl Inquiry*, 1 : 84–105. Univ. Press, Cambridge, Eng. A very interesting summary of Old World data with seven maps, a discussion of results of ringing in the breeding quarters, wintering quarters, and on migration, with notes on anomalous behavior of individuals, as when a Mallard raised in England breeds in Sweden, etc. Although duck populations in Great Britain are mainly stationary, on the whole most of the ducks seem highly migratory, while many of them exhibit a wide variety in routes.

No. 16 is based on the technique of color banding.

MIGRATION

3. Homing and Earth Magnetism.—(Heimfindeversuche und Erdmagnetismus.) A. Daanje. 1941. *Vogelzug*, 12 : 15–17. A discussion of Stresemann's theory which is based on that of Viguier, and of experiments in this field. Casamajor and Wodzicki placed magnets on birds' heads with negative results; such contrivances are very unpleasant to birds and disturb their behavior. Schein's starlings raised in captivity failed to return when released at a distance; Daanje believes this due to the wire cage in which they were kept, for this would confuse the magnetic field. He started experiments with the European Quail (*Coturnix coturnix*) in a cage of wood, copper and netting; however, his birds escaped and he himself was mobilized.

4. An Analysis of the Influence of Weather upon a Migratory Movement of Birds.—J. Ritchie. 1940. *Proc. Roy. Soc. Edinburgh*, 60 : 299ff. Data relative to the 1921 invasion of Bohemian Waxwings (*Bombycilla garrulus*) into Denmark and Great Britain. The movement occurred during three weeks when the barometric pressure in Scandinavia was very high; it was preceded and followed by very low pressures. The migration proceeded from an area of high pressure towards one of low pressure during anticyclonic conditions. Temperature was "normal" for the season. Of thirteen "waves" of migration, twelve started under overcast skies; with twelve the wind was easterly or southeast. It is suggested the birds started south and were blown to Great Britain.

5. Spring Flight of Diving Ducks through Northwest Iowa. J. B. Low. 1941. *Condor*, 43 : 142–151. Migration occurred a week late in 1940 in correlation with abnormally cold weather from March 21 to April 1. Sex ratios are given for seven species in Iowa and Saskatchewan and for three in Louisiana; in all

cases males outnumber females; in six species of Nyrocinae from 1.13–1.80 males to one female, and in the Ruddy Duck (*Erismatura jamaicensis rubida*) 2.29 to one female.

LIFE HISTORY

6. The Diving Habits of Ducks and Grebes.—G. C. S. Ingram and H. M. Salmon. 1941. *Brit. Birds*, 35 : 22–28. Analysis of many records, correlating length of dives "with depth of water, nature and relative abundance of the food-organisms, and other local conditions."

7. Studies on the Distribution and Habits of the Sharptail Grouse in Michigan.—F. M. Baumgartner. 1939. *Trans. 4th No. Am. Wildlife Conference* 1939 : 485–489. *Pediocetes phasianellus campestris* has extended its range to the east, probably coming into the west end of the Upper Peninsula in the wake of extensive fires before 1920. It is now an important game bird in northern Michigan. On bright, warm winter days Sharptails leave their snow roosts shortly after sunrise, eat till the middle of the day, then bury themselves in snow or sit in the sun; then feed from mid-afternoon till dusk. On cold, stormy days they leave the roosts at 8 or 9, fill their crops with birch or aspen buds, and by "9.30 or 10.00 A.M. they are back into their snow forms for a 22-hour period of inactivity, not emerging until the following morning," p. 487.

Nests may be placed within two-thirds of a mile of the dancing grounds; clutches average 12+; they do not vary in size from year to year. The author discusses food habits throughout the year.

8. On the Breeding of the Black-headed Gull on the Bare Islands of the Schärenhof.—(Ueber das Brüten der Lachmöwe, *Larus r. ridibundus* L., auf Felseninseln im Schärenhof und die Ursachen dazu.) K. A. Frederikson. 1940. *Ornis Fennica*, 17 : 62–63. In the last 15–20 years the Black-headed Gull has been nesting in increasing numbers on bare islands. Sometimes the birds make a second attempt here after being flooded out in the marshes on the mainland; only one-fourth of the nests have three eggs; blue eggs are common. They nest without friction with the Common Terns (*Sterna hirundo*); the young gulls swim a great deal and influence the young terns so that these swim much more than do terns that nest in colonies by themselves.

9. "White-faced Terns."—Ralph S. Palmer. 1941. *Auk*, 58 : 164–178. With both Common and Arctic Terns (*Sterna hirundo* and *paradisea*) there are a certain number of white-faced examples (eclipse plumage) on the breeding grounds; they may be young or old. Terns normally breed at two or three years of age, usually the latter.

10. Taxonomy and Habits of Pigeons.—E. W. Gifford. 1941. *Auk*, 58 : 239–245. Brief notes, largely on gait and courting behavior, of the suborder Columbae.

11. Some Notes on the Long eared Owl.—E. J. Hosking. 1941. *Brit. Birds*, 35 : 2–8. Several whole nights were spent watching a nest of *Asio o. otus* at a distance of seven feet. The female incubated quietly. The "cock paid on an average five or six visits to the nest between dusk and dawn." The author emphasizes the remarkable "ability of the owl to see well enough to hunt and to thread its way through the intricacies of a wood in what appears to be utter darkness to human eyes." p. 8. The manner in which the hen fed small young under her is described and splendid flashlight pictures of the parents are given.

12. Winter Behavior of Ravens at Tomales Bay, California.—J. E. Cushing, Jr. 1941. *Condor*, 43 : 103–107. Observations on roosting of about

200 *Corvus corax* in a brushy canyon during fall and winter. Some of the birds apparently travel at least 40 miles a day.

13. Relative Growth in the House Wren.—Sara E. Huggins, 1940. *Growth*, 4 : 225–236. A statistical study of growth in 30 nestling *Troglodytes aedon* with graphs on weight and various measurements. A maximum in weight was reached at twelve days, a slight decreas occurring in the next two days.

14. Notes on Breeding of Black Redstarts in Kent. P. A. Rayfield, 1941. *Brit. Birds*, 34 : 186–188. *Phoenicurus ochrurus gibraltariensis* is a rare breeder in England. One pair had for its territory "a dumping ground for timber, iron, cable drums, etc., surrounded by buildings, some high, some low." Incubation was by the hen and lasted 12–13 days; fledging took seventeen days and the young were fed by their parents at least eleven days longer. The male sang except when the young were in the nest. Another pair fed the young some three weeks after they left the nest.

15. The Black Honeyeater. J. D. Waterhouse. 1941. *Emu*, 40 : 385–387. In one nest the female *Myzomela nigra* disappeared and the male incubated for a week; the eggs proved infertile. At another nest the female was fearless after the young hatched, allowing herself to be touched on the nest; after they were five days old, she feigned injury each time the author approached the nest.

BIRD BEHAVIOR

16. Annual Cycle of the Black-capped Chickadee. E. P. Odum. 1941. *Auk*, 58 : 314–333. A very interesting study, using colored bands, or territory and nesting in *Parus a. atricapillus* in Rensselaerville, N. Y., with a map showing the territories of fifteen pairs. No evidence was noted of attachment between a pair in the winter flocks. Where "the winter-dominance relations were known, the male was dominant over the female when the two were in the winter flock." The criterion of dominance was that the "females withdrew or were driven away when they came in close contact (as at feeding station) with males." After pairs were formed "the male was not seen to exert dominance over his mate," p. 323. The most dominant males nested in the vicinity of the winter ranges. Feeding of the female by the male is regular during incubation; is sometimes seen during egg-laying and nest construction, but not earlier. The *phoebe* song apparently intimidates other males and attracts females; later it "functions in territory defense." It is also given by the female but less often and less loudly. "Territory is established after, rather than before pairing," and "the birds do not make themselves conspicuous on it," p. 330.

The pair wander about during the pre-nesting period, keeping in touch with each other with soft *seeps* or loud *chickadees*, and "warn" with *see-see* and freeze at the appearance of a winged enemy. They are antagnostic to other Chickadees. Fighting at this time is "clearly a defense of mates and not of territory since the birds later established territory elsewhere," 326. This might be considered "defense of a 'sexual territory' as contrasted with a later-established 'nesting territory'" (Noble, 1939). It is quite "probable that the finding of a suitable nesting site is a determining factor in territory establishment." The Chickadee "does not regularly proclaim or announce ownership of territory," p. 327. Territory conflicts consist of three parts: a challenge—loud *chickadee* or *phoebe* calls—; a chase; a fight in mid-air. They do not defend their territory from other species. Territories varied in size from 8.4 acres (3.4 hectares) to 17.1 acres (7 hectares), averaging 13.2 acres (5.3 hectares). The size of the territory decreased as nesting progressed. One pair "covered only about half the area while feeding the young

that they did during incubation." "The function of the nesting territory in the chickadee must be simply to protect the pair from the disturbing influences of other chickadees during the period of nesting," p. 330.

17. Intelligence Tests with Tits. M. Brooks-King. 1941. *Brit. Birds*, 35 : 29–32. A pair of Blue Tits (*Parus caeruleus obscurus*) and Great Tits (*Parus major newtoni*) were tested with various problems in getting peanuts; they proved quick in discovery and in the matter of obtaining nuts by pulling a string. A more complicated apparatus depending on accidental knocking down of a box was solved only by the male Great Tit; after one experience he repeated his tactics without error.

18. The Sexual Displays of Swallows. P. H. T. Hartley. 1941. *Brit. Birds*, 34 : 256–258. Both male and female *Hirundo r. rustica* sang. The birds indulged in slow, wavering flight with tails fanned and also a "display of the red feathers of the face and throat." The pair sit side by side and warble; the hen assumes an "acquiescent display."

19. Voice in the Brown Towhee. C. W. Quaintance. 1941. *Condor*, 43 : 152–155. An analysis of the significance of the various notes of *Pipilo fuscus petulans* in California. A metallic *chip* has different functions—protest and contact; at *tsink*, fledlings froze; *tssp* was used for contact between mates; the hunger notes of nestlings and fledglings differed; a squawk when handled signified distress and perhaps intimidation; while the "scold" is really a greeting between mates.

20. Song of the Female Chaffinch. G. O. Warburg. 1941. *Brit. Birds*, 34 : 261. A female *Fringilla coelebs* gave a song that had the "first notes of a typical Chaffinch song, but the ending was missing and some harsh, guttural thrush-like notes were added."

21. Nest-Sanitation.—R. H. Blair and B. W. Tucker. 1941. *Brit. Birds*, 34 : 250–255. A continuation of the subject, mostly records of individual species. Two instances are given where no faeces were carried while the young were temporarily in an annex to the nest. In three cases after young left the nest and were still huddled together, parents carried excreta—Spotted Flycatcher and Willow Warbler.

22. "Anting" by the Cardinal. L. L. Snyder. 1941. *Auk*, 58 : 414–415. Three *Richmondena cardinalis* "anted" for 2½ hours with "small, winged 'red' ants, hosts of which were emerging from the ground." "At the end of this time their body feathers appeared wet as if the birds had been bathing." Apparently the ants were eaten.

23. Observations on "Anting" by Birds.—H. R. Ivor. 1941. *Auk*, 58 : 415–416. The most extended observations on this behavior yet published. The author describes in some detail collective anting in his aviary of semi-captive native birds; he has seen it performed by 19 species of 7 passerine families, 3 families and 16 species being new records. The Bronzed Grackle (*Quiscalus quiscula aeneus*) "anted" with choke-cherries.

Incubation

24. Incubation Studies of the Yellow-headed Blackbird.—R. W. Fautin. 1941. *Wilson Bulletin*, 53 : 107–122. Observations on *Xanthocephalus xanthocephalus* in Utah. The female alone incubates; the nests are too small for the male. Incubation period lasts 12 and 13 days; more eggs hatched in twelve days in April than in June. An interesting table is given of the percentage of daylight

hours spent on the nest during incubation by eight passerine species (five of them European); these range from 58.7 with the Song Thrush (*Turdus ericitorum*) to 84 with the Marsh Tit (*Parus palustris*); the Yellow-headed Blackbird spent 63.9 per cent of the day on the nest. Periods on the nest with this species ranged from 1–41 minutes, averaging 9.1 minutes; periods off ranged from 1–18, averaging 5.4. The longest periods on the nest came at midday, apparently as a protection to the eggs from the heat of the sun. Although defending nesting territories, the birds of a colony cooperate in chasing enemies. Yearling males did not breed. The hatching success of the 443 eggs was 314, 70.9 per cent.

25. Egg Temperatures of Wild Birds Under Natural Conditions.—R. A. Huggins. 1941. *Ecology*, 22 : 148–157. An important study. By inserting a thermocouple into an egg and returning it to the nest, and then recording the temperature variations while watching from a blind, the author found the average egg temperature of 37 species of birds from Ciconiiformes to Passeriformes to be 34° C. (93° F.) "The galvonometer records were all two hours or over in length. The average for attentive periods is 34.3 C°., for inattentive 33.4° C. (Baldwin and Kendeigh's ('32) study showed that eggs in *the center of the nest* fluctuated between 34° and 37° C.) No evidence was found of difference in day and night temperatures. Eggs in the center of the nest averaged considerably higher than those on the outside. Eggs warm faster on cold days than warm, probably the result of closer sitting. No difference was found in the rate of warming of passerine and non-passerine eggs of the same size; small eggs warm faster than large ones. There is a correlation between air temperatures and egg temperatures, and less cooling in well-built nests than loose ones. It is surprising how often the temperature of the inattentive period equals, or occasionally surpasses the attentive period.

There are no data on the stage of incubation; well developed embryos presumably would have higher temperatures than fresh eggs. One wishes for more details as to incubation rhythms, more detailed records on certain birds, more graphs of incubation. In fig. 5 the Bluebird three times during an hour brought the eggs up to 32°–34° C., then left; how usual is this procedure? (The first table on p. 155 shows an abnormal condition in that the Song Sparrow left her eggs 87 minutes instead of the typical 8.) The General Table of Egg Temperatures would have been more valuable if the length of time of each record had been given —whether six hours or three or four days—, as well as the number of periods on and off, their length, etc. The author must have a vast amount of valuable material not given in this paper.

26. Possible Factors Controlling Length of Inculation in Birds. R. A. and S. E. Huggins. 1941. *American Naturalist*, 75 : 282–285. A disappointing paper. Equal weight is given to the unreliable articles as to the real contributions. Although the authors refer to Heinroth's classic paper, they do not appear to have studied it. Nor do they seem to have been acquainted with the criticism in *Bird-Banding*, April, 1940 of Worth's article. They conclude that "there is a general positive correlation between egg weight or volume and length of incubation" and call for more data. We already have enough data to know that this is far from true.

LIGHT VERSUS ACTIVITY

27. Light Versus Activity in the Regulation of the Sexual Cycles of Birds: The Role of the Hypothalmus.—Albert Wolfson. 1941. *Condor*, 43 : 125–136. A scholarly discussion of the problem; the author reviews the experiments of Rowan, Bissonnette, Benoit and Riley, and cites the recent work of physiologists that show the important part played by the hypothalmus in

regulation of sleep. The suggestion is made that Rowan's Juncos kept awake without light showed gonadal increase because trained to use of the bar in the daytime; Riley's English Sparrows were not so trained. The author suggests an explanation that will reconcile the two opposing camps—those who believe that it is light *qua* light that stimulates increase of gonads and those who consider it is due to longer periods of activity. "As the days increase in length, birds are awake for longer periods of time because the state of wakefulness, at least in some birds, is a conditioned response to light; the concomitant activity of the hypothalmus causes an increased production or release, or both, of the gonadotropic hormones from the anterior lobe of the pituitary; these in turn, stimulate gonadial recrudescence," p. 132. The hypothalmus "plays a part in fat metabolism;" in some cases "prior to migration a heavy subcutaneous and abdominal deposition of fat occurs," p. 133. "Light is an important factor in the regulation of the sexual cycle, but only in so far as it provides a stimulus for wakefulness. Since the wakefulness is under the control of the hypothalmus, the hypothalmus becomes the important center for the sexual cycle," p. 135.

Ecology

28. Birds of a Prairie Community.—S. C. Kendeigh. 1941. *Condor*, 43 : 165–174. On 50 acres of prairie in northwestern Iowa 50 pairs of four species nested. The Western Meadowlark (*Sturnella neglecta*) and Grasshopper Sparrow (*Ammodramus savannarum*) "had well-defined territories, averaging in size about 22 and 3.4 acres respectively," while the Bobolink (*Dolichonyx oriziverous*) and Ring-necked Pheasant (*Phasianus colchicus*) "appeared not to possess territories after mating had been completed, and there is evidence that both species were polygamous." A special study was made of the Yellow Warbler (*Dendroica aestiva*) nesting on the forest-edge; it was found that "territorial requirements included suitable nest-sites, concealing cover, tall singing posts, feeding areas in trees, and space"—about two-fifths of an acre—but where singing posts or breeding areas were lacking, confusion ensued with much chasing, perhaps due to "the inability of the birds clearly to define the limits of their territories by singing." Maps are given showing the location of nests and territories of these five species. Curiously enough, healthy young of the Bobolink and Meadowlark were "not attacked by the abundant biting ant (*Formica cinerea neocinerea*)," but nestling Yellow Warblers, placed in a trap on the ground for 15–30 minutes were quickly attacked. A valuable study of a partially undisturbed area.

29. An Eight-Winter Study of Central Iowa Bob-Whites.—P. L. Errington. 1941. *Wilson Bulletin*, 53 : 85–102. An excellent population study on *Colinus virginianus* on different areas, one a stable environment, others unstable. "Numerical values for carrying capacity usually differed with the locality but typically remained about the same from one winter to the next on specific areas unless significant changes in environmental equations took place—*sometimes despite profound modifications in food and cover relationships*," p. 89. "Autumnal fighting between coveys has been noted alike for the Valley Quail (*Lophortyx californica vallicola*) in California (Emlen, 1939 : 129) and for the Bob-White, and both species may violently exclude strangers from covey groups," p. 91. In late winter birds "may accustom themselves to living with less brushy cover than they require in late fall and early winter." Population levels were low in 1934–35 and 1935–36 due to too dry and too wet summers and severe cold, but later populations in the various areas reached much the same level as before. Bobwhite will not tolerate undue populations of their own species, nor of the Ring-necked Pheasant.

"The likeliest mechanism behind these toleration phenomena seems to be

dominance by veteran individuals that have their own ideas as to what constitutes desirable or safe numbers of birds in specific habitats. As long as the habitats are fairly well filled each winter, there should be a greater chance of 'traditions' being retained, either through continued presence of dominant old birds or through successors having had previous local experience," p. 99.

30. The Comparative Economy of Closely Related Birds on an Island and a Continent.—A. J. Marshall and T. H. Harrisson. 1941. *Emu*, 40 : 310–318. Based on studies on Espiritu Santo, New Hebrides and Australia. On islands there is little tendency to flock, "decrease in voice, stronger nests, smaller clutches and food specialization," p. 318.

31. Bluebird Mortality in 1940.—T. E. Musselman. 1941. *Auk*, 58 : 409–410. During late February and March 1940 large numbers of *Sialia sialis* were destroyed by ice and snow; the author believes that 50 per cent of his nesting birds in central Illinois were lost. In Lockport, Ill., 50 per cent of 35 boxes were occupied from 1935 to 1939, in 1940 there was only one pair.

32. Great Mortality among young Black Terns from Severe Weather. (Groote sterfte onder jonge zwarte sterns, *Chlidonias n. niger*, door slechte weersomstandigheden.)—H. Ruiter. 1940. *Limosa*, 13 : 150–151. 123 sets were found in 1940, 20 per cent more than in 1939; cold rainy nights in July brought most of the chicks to their ends.

BIRDS AND THEIR FOOD

33. A Group of Bat-Eating Duck Hawks.—K. E. Stager. 1941. *Condor*, 43 : 137–139. Six *Falco peregrinus* preyed upon a great colony of Mexican free-tailed bats (*Tadarida mexicana*) in south-central Texas.

34. Feeding Habits of the Black Oyster-catcher.—D. J. Webster. 1941. *Condor*, 43 : 175–180. Observations on specialized techniques of *Haematopus bachmani* of dealing with mussels, limpets and chitons, comparison being made with Dewar's (1913) studies on the European Oyster-catcher (*Haematopus ostralegus*). A list is given of species of shellfish, etc., found eaten by the Black Oyster-catcher in the Sitka Islands.

35. Hawfinches and Cherries.—C. Ingram. 1941. *Brit. Birds*, 34 : 220. *Coccothraustes c. coccothraustes* never nested in the author's garden until his collection of Japanese and other cherries came into bearing; first one pair nested, then two and now three nest. The Hawfinches eat all the cherries.

BIRD NUMBERS

36. Size of Bird Flocks in Winter.—Leonard Wing. 1941. *Auk*, 58 : 188–194. From data in *Bird-Lore's* Christmas censuses.

37. Comparison of 1935 and 1940 Populations of Nesting Bald Eagles in East-cental Florida.—J. C. Howell. 1941. *Auk*, 58 : 402–403. In 1935 there were 24 pairs of *Haliaëtus leucocephalus* in an area where only eighteen were present five years later. Ten of these were using the same nests as in 1935. The decrease is probably due to the increase of human inhabitants and "the felling of the pines used as nesting sites."

38. Spring and Winter Hawk Censuses from Illinois to Oklahoma.—

M. M. Nice. 1941. *Auk*, 58 : 403–405. On 1,424 miles of driving in March one hawk was seen each 18.5 miles; on 1,075 miles in December one each sixteen miles. In "Illinois hawks were twice as numerous in March as in December, while in Oklahoma, on the contrary, they were four times as numerous in winter as in spring." Tables are given showing numbers and species seen in each of three states in the two seasons.

BOOKS

39. A Field Guide to Western Birds.—Roger Tory Peterson. 1941. Boston. Houghton. 240 pp. $2.75. It is hard to imagine a more helpful guide to the puzzling birds of the west than this little book, full of illustrations and descriptions that emphasize distinguishing characters. A map of the United States shows the part of the country—from the western portion of the Great Plains to the Pacific Coast—covered by the book. There are six plates in color, each showing many birds. "The plates and cuts scattered throughout the text are intended as diagrams, arranged so that quick, easy comparison can be made of the species that most resemble one another." The guide is intended not only for the beginner, but to assist the "advanced student" in "recognizing those accidentals or rarities that sometimes appear in the territory he knows so thoroughly." A list is given of handbooks of the western states. The question of subspecies in the West is a difficult one, especially since the common names of many give no inkling as to which species the bird belongs. Mr. Peterson has solved this problem in a masterly way; each species is described as a unit and under it the subspecies listed, while at the end of the book the range of each subspecies is given. All in all, a fascinating book, and one that should prove as indispensable in the West as the "Field Guide to the Birds" is in the East.

40. Love-Life and Nesting of Birds. (Liebes- und Brutleben der Vögel).—Heinrich Frieling. 1940. Kosmos, Gesellschaft der Naturfreunde. 80 pp. An excellent little book giving in popular narrative the results of the findings of Heinroth and Lorenz and also of other ornithologists, chiefly German and Dutch. The chapters treat of Betrothal, Marriage and All Sorts of Love-Making; Nest and Eggs; When the Young Hatch; How the Young are Cared for; the Strange History of the Cuckoo. There are two paragraphs on Sources, mentioning fourteen authors and five books and a one page index. Various writers and their discoveries are mentioned in the text, but no references given. Although not a book for the serious student already familiar with the literature, yet it is an admirable guide to the layman and bird lover, for it gives a simple, straightforward account of bird behavior, and is refreshingly free from anthropomorphising.

41. Animal Behaviour. Impulse, Intelligence, Instinct.—J. A. Loeser. 1941. N. Y. Macmillan. 178 pp. $2.00. Dr. Loeser, a political refugee from Berlin, died in 1939, at which time his manuscript "was finished in a rough way, but not revised." It seems to have been prepared for the press by an Englishman, L. F. J. Brimble. There is a brief index, but no references. Dr. Loeser finds animal behavior exceedingly simple; there are no instincts, but instead chiefly responses to "sensations"—a seeking of "pleasure" and avoidance of pain. In discoursing on the behavior of bees, the author states that the "assumption" of instinct here "is absurd." "The truth is that we have here another example of that marvellous harmony of pre-formed factors and psychological reactions to sensations which we have so often seen before," p. 141.

As an example of his logic let us turn to an ornithological illustration. On page 39 we learn that "Nothing remains of a 'nest-building instinct', that classical example of the instinct theory." For the "reason . . . to seek or build a nesting-place . . . is the appearance in hatching-time of the so-called 'hatching-spots'

on the bird's front. These spots cause the bird to seek a support or resting-place which will offer it a certain soothing pressure and probably cooling surface. This does not occur until the exciting preparations for pairing are over, after which the irritation caused by the hatching-spots leads the bird to build a nest."

(Unfortunately for this extraordinary explanation, incubation patches appear *after* the nest has been built.)

This is a fair sample of the book—the vague, meaningless statements, the jumble of half-truths, the absurd pseudo-zoology. Why should such a book ever have been published?

Notes and News

A recent issue of *Bird-Banding Notes* (Vol. 3, No. 3) issued by the Fish and Wildlife Service states the present situation in regard to the present and future supply of bird bands. The announcement reads in part, "It is hoped that it will not be necessary to curtail the banding work. Nevertheless, it is possible that the regulations regarding the use of aluminum for non-defense purposes may affect the supply of bands, especially of the larger sizes. Enough bands are on hand for present needs, but any co-operator who finds himself overstocked with large bands (sizes 6, 7, and 8) will do the Service a favor by returning those he is not likely to use."

The first of a series of informal regional meetings of the Northeastern Bird-Banding Association was held at the Wharton Bird Banding Station, Groton, Massachusetts, on August 23 with twenty-three persons in attendance. Those present had an opportunity of examining an exhibition of shrubs attractive to birds and made the rounds of the station where a number of different types of traps were seen in operation. An out-of-doors roundtable discussion followed.

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A Journal of Ornithological Investigation

(Published Quarterly)

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